Marine Review

SHIP OPERATION SHIPBUILDING CARGO HANDLING

The National Publication Covering the Business of Transportation by Water

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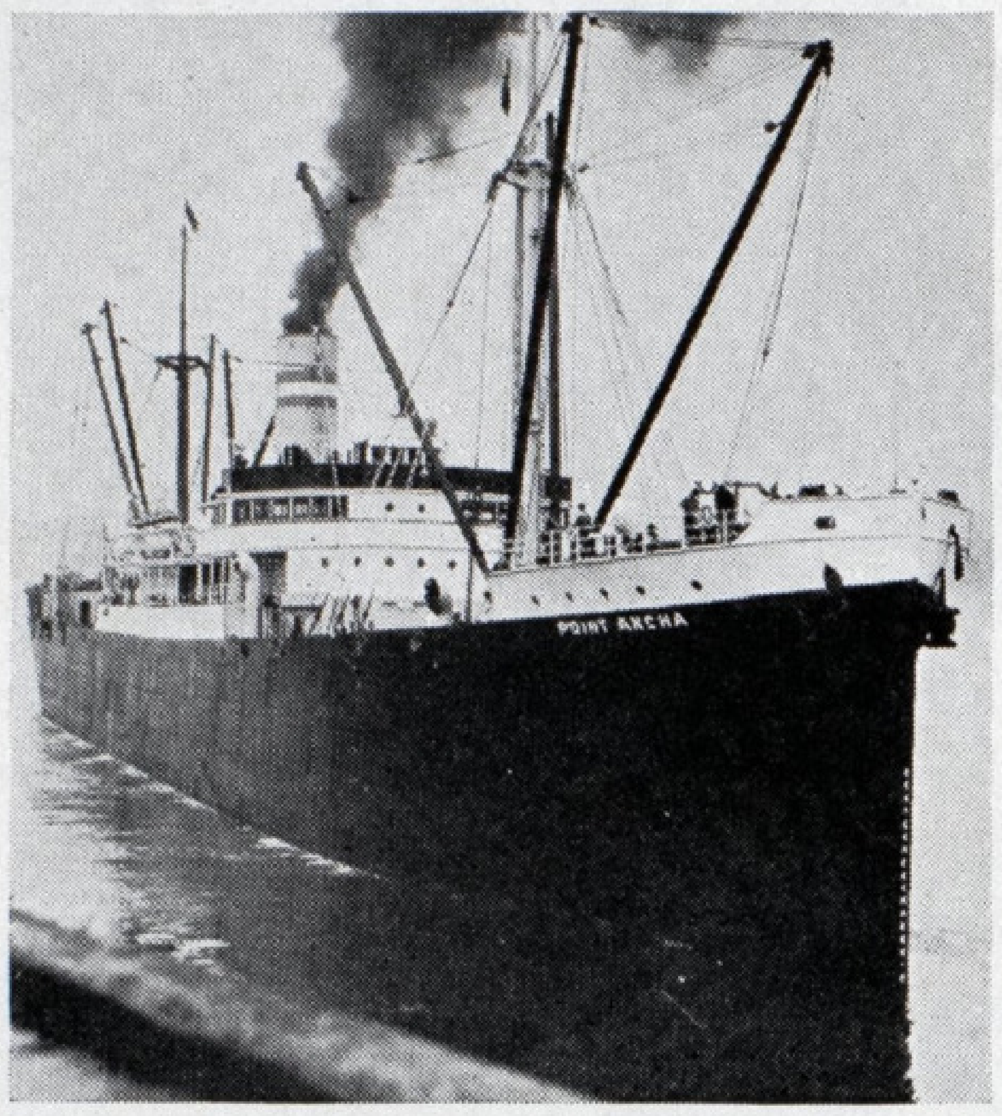

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Volume 64 December, 1934 Number 12

Need New Ship Model Tank, Advance in Ship Design

AT THE recent meeting of the Society of Naval Architects and Marine Engineers in New York, the president of the society strongly urged the authorization of funds to proceed at once with the construction of a new national ship model tank. If we are to keep pace with other maritime countries in the scientific development of ship design such a tank is a necessity. It is of great importance to the merchant marine and to the navy. It will directly apply to both ocean going vessels and those on inland waterways. It is a national project, including aviation as well as all shipping. It would be largely self-liquidating since tests for private companies and individuals are done at cost.

As the president of the society pointed out, the navy department has selected a site and has completed plans and specifications for the new tank. Everything is ready to proceed as soon as the funds have been allotted.

Importance of Research and Experiment

The forward looking vessel owner realizes the vital importance, not only, of the skillful practical application of the most advanced existing technical information to the design and construction of ships, but also that study, research and experiment should be encouraged in order to achieve still better results. This project, therefore, which is now before Harold L. Ickes, as public works administrator, should receive the support of every shipowner by going on record in its favor.

Of special significance also was the suggestion of the president of the society that a research be made on a large scale, into the economics of shipping. Due to the number of problems involved and their complexity this research should be conducted by a governmental agency or by endowment of a research body at one of the larger universities.

The vast range of the development of naval architecture and marine engineering in the past 124 years and the genius of one of its pioneers are vividly brought to mind in the paper, presented at the meeting, reproducing many of Robert Fulton's original drawings. That it may well be worth while to consider, on the basis of original design, the justification of what has come to be more or less, stereotyped standard practice in ship structural design is the interesting theme of another paper.

Practical Design Is Advanced

Again the valuable work of the United States experimental model basin is emphasized by papers on propeller design and measurement of propeller thrust on shipboard. Knowledge of both of these important factors in ship design is thus advanced. Is ground tackle, following established routine practice, heavier than need be, is the question asked and partly answered in the affirmative, in another valuable contribution by the navy to ship design.

Ventilation of ships including the currently important subject of air conditioning; arc welded ship construction; marine and naval boilers, their design and application; bunker fuel oil problems; and safety in the design of small tankers, are some of the additional subjects covered in papers presented at the meeting and referred to in more detail beginning on page 11. These papers cover a wide range of technical information of value in the improvement of the design and operation of ships.

In the United States navy there are no battle cruisers. The value of this type of vessel as demonstrated in action brings the author of the paper on the battle cruiser to the conclusion, "Large navies of the near future will be at a disadvantage without vessels of this type."

MORRO CASTLE,

Investigating Committee Recommends Wider Federal Supervisory Powers

ON OCT. 26 Dickerson N. Hoover, assistant director of the bureau of navigation and steamboat inspection, submitted a report to the secretary of commerce covering his investigation of the destruction by fire of the steamer Morro Castle. This report is a voluminous document containing numerous exhibits and many pertinent quotations from the testimony taken at the investigation. After giving a preliminary statement and chronological account of the events in connection with the disaster the report goes into the lessons learned with suggested recommendations.

Failure of the Human Element

WITH reference to the human element, the report states, "Since the human equation failed in this disaster, it is apparent that more attention must be given to that feature of inspection." It is suggested in licensing officers that examinations of high and uniform standard be prepared at Washington and that such examinations are to be used throughout the service. Able seamen should be certificated only after three years service at sea and on passing an actual practical oral examination by the local inspectors.

It is recommended that rules and regulations be amended to provide a standard form of fire and boat drill with more specific requirements than at present.

Immediate attention should be given to fireproof construction of passenger ships not alone to the use of non-combustible material for construction but also to the manner in which this material is put together. Ship design should cover not only the zoning of the vessel by subdivision bulkheads in the hull and fire screen bulkheads in the superstructure, but should also cover the control of drafts, ventilating systems, stairways, elevator shafts, etc. Furniture and drapes should be fire resisting. Particular attention should be given to paint, lacquers and varnishes used on such vessels.

Reference is made to suggestions heretofore strongly emphasized by the supervising inspector general for a reorganization of the steamboat inspection service. The report again calls attention to the need of such reorganization under which a fully qualified technical staff at Washington would pass upon construction of hull and superstructure.

Stricter Fire Control Regulations Needed

THE REPORT calls attention to the fact that fire control was not covered in detail at either of the international conferences on safety of life at sea at London in 1914 and 1929. It is suggested that it is not necessary to await international action with reference to fire control regulations as far as American ships are concerned, but that it can be done by proper congressional legislation. Referring to the existing regulations covering fire detecting systems it is recommended, that the placing of sentinels or thermostats in public places, not now required under the rules should in the future be mandatory.

It is recommended that the licensing and discipline of radio operators on ships be transferred to the bureau of navigation and steamboat inspection.

Laws relating to the limitations of liability and salvage, the report states, should be revised.

The inquiry considered first, the cause of the disaster; second, the responsibility of the service as to inspections and re-inspections, and especially with reference to the efficiency of the personnel of the ship; third, what lessons are to be learned from the disaster. The last of these has been covered briefly above. Considering the cause of the disaster, the report calls attention to the following: rapid spread of the fire, delay in sounding the alarm, ineffective fire alarm, delay in rousing passengers, ineffective marking of emergency exits, inefficient use of fire prevention equipment, the crew divided into improper watches, improper emergency organization, lack of training and discipline of crew, delay in sending the S. O. S.

The report states that the ship was practically destroyed by fire and that study of the testimony does not definitely fix the cause of the fire; also, that when it was discovered, it had reached such serious proportions that its origin is in doubt.

Actions of Ship's Personnel in Emergency

AFTER specifically referring to the two fire indicating systems for indicating the presence of fire and to the actions of the watchmen who were commended for their alertness the report continues:

"When the fire was discovered there does not seem to have been any uniform or concerted effort on the part of the stewards to wake up and assist the passengers and lead them to safety. While that unfortunate condition generally existed, it is only fair also to say that there were instances of persons employed in the stewards' department who undoubtedly did their duty in this respect and I refer particularly to James Bertoei and Mrs. Lena Schwarz.

"What does stand out clearly, however, is that the ship's officers failed to control the situation with the strong hand that was necessary in such an emergency. When the fire alarm sounded, the crew did not take their regular fire stations, nor was any effort made on the part of the officers to organize them and make a concentrated effort to meet the emergency existing . . ."

"The engine and fire room watch stayed at their posts until driven out through the emergency exits. It is apparent that the same cannot be said of the chief engineer who never appeared in the engine room during the fire to inform himself as to the condition of his department, and the first assistant engineer paid but a short visit to the engine room, and he was apparently the first member of the stand-by crew of the engine department to make his exit.

". . . Captain Warms after being notified that the ship was on fire, continued on his course at 18.8 knots for 3.1 miles before sounding the fire alarm, and the testimony indicates he continued for some distance thereafter before undertaking to turn the ship. Had he taken prompter action in this respect it is possible that he may have been able to have controlled the fire, or at least to have controlled it to such an extent as to have been able to have saved a larger number of passengers."

The report gives a statement of the number of persons saved and lost in the disaster. Of the 318 passengers on board, 228 were saved; 84 reported dead; and 6 missing. Of the 230 all told, officers and crew, 196 were saved, 30 reported dead, and 4 missing.

NAVAL ARCHITECTS

Hold Forty-Second Annual Meeting

THE growing influence and prestige of the Society of Naval Architects and Marine Engineers was evident in the unusually large attendance and lively interest of members and visitors at the forty-second annual meeting held in New York on Nov. 15 and 16. The president of the society, Rear Admiral George H. Rock, CC, U.S.N. (retired), presided. Admiral Rock was elected president at last year's meeting for a term of three years, beginning Jan. 1, 1934.

Papers presented at the technical sessions, which opened at 9:30 a. m., Nov. 15 and continued throughout two days, brought out many valuable discussions with much additional information. Foreign recognition of the high standing of the society was again indicated this year by an excellent contribution on *Ship Structural Design*, by the British naval architect, E. F. Spanner.

At the morning session on Nov. 15 the annual address was presented by Admiral Rock.

Address by Admiral Rock

I THANK you again for the great honor you have conferred upon me by election to the position which has been filled in the past by men outstanding in the profession—names nearly as well known and fully as much respected abroad as at home. It is a great regret that three of our ex-presidents who have contributed so much to the formation, growth and success of our society are prevented by illness from attending our meetings. Our thoughts and our affections are always for them as are our sympathies for them and their families, more particularly during our annual meeting when we feel the loss of the stimulation and support of their presence.

Report of Secretary-Treasurer

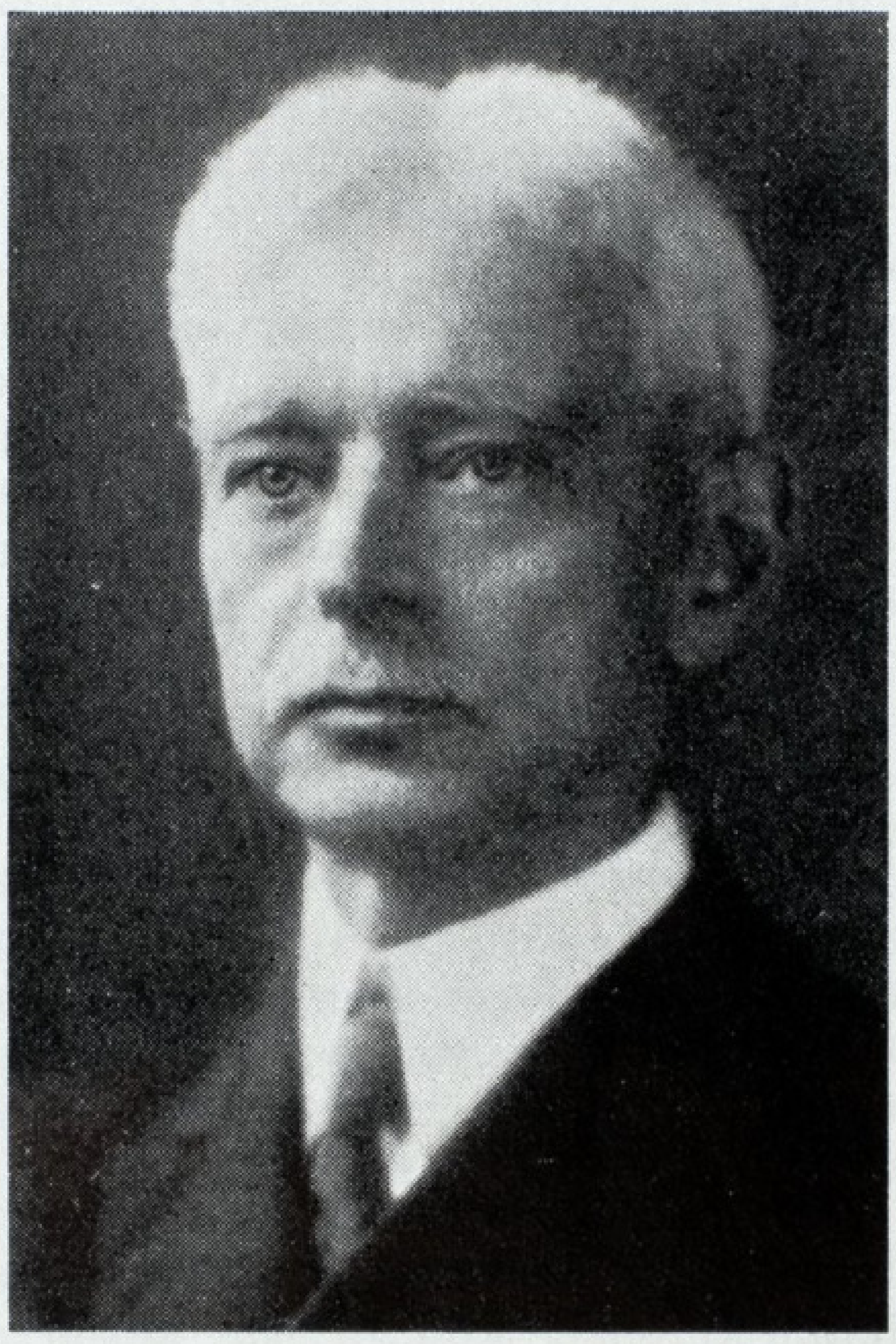
From the report of our secretary-treasurer, you know the gratifying condition of the finances of the society. The membership shows a decrease from the preceding year, but not more than is accounted for by conditions which have been cumulative over several years. Our membership necessarily reflects the general condition of the shipbuilding industry and it is only reasonable to expect that the recent and prospective increase in shipbuilding employment will be followed by an increase in our membership.

Technical Progress

During the year the construction of two superliners has been resumed abroad. These vessels, the British QUEEN MARY and the French NORMANDIE, are reported to be in the neighborhood of 75,000 gross tons and over 1000 feet long and will be the largest vessels constructed for the North Atlantic service.

It is reported recently that a number of cargo ships of 500 feet in length and about 16 knots, service speed are under construction for British companies engaged in the transport of refrigerated cargo.

In Japan, due to the stimulus of government subsidy for the replacement of obsolete vessels by new high speed cargo vessels, 39 cargo ships of about 18 knots speed and 277,000 gross tons have been built since the beginning of 1929. While these vessels have been built primarily to engage in the silk trade, they would also be valuable auxiliaries to the Japanese navy in a time of emergency.



Rear Admiral G. H. Rock (Ret.)
President, Society of Naval Architects and Marine Engineers

As shown by the amount of merchant tonnage under construction in the different countries for the quarter ended July 1, 1934, United States stands ninth. We are far behind in the new tonnage we should have to hold our position in foreign trade in competition with the more modern vessels of other nations.

During the year two cargo vessels were delivered by the Newport News Shipbuilding & Dry Dock Co., for the A. H. Bull Steamship Co. These vessels, the ANGELINA and the MANUELA, are the first cargo vessels designed for general use in overseas trade which have been delivered from American shipyards since 1922. Reports of their performance are very favorable.

During the year the much heralded new type of British cargo ship of arcform design made its initial visit to the United States. The appearance of this vessel in New York harbor aroused considerable interest among our members. The press reports indicate that the owners consider the performance satisfactory, and our members will watch with much interest the results of continued operation of this type of vessel.

Use of welding in ship construction has continued to increase at a normal rate. In the United States a diesel oil tanker 260 feet long, 40 feet beam, and 14 feet depth, of all welded design, was launched on Aug. 3 at the Staten Island plant of United Dry Docks Inc. This vessel is the largest American built merchant vessel of all welded construction to date.

In recent years there has been a gradual but continual increase in the percentage of ships using oil for fuel instead of coal. While ten years ago the total tonnage of vessels of 100 gross tons and over which used oil was 28 per cent as compared with 72 per cent for coal burners. Recent records show that coal has fallen to 55 per cent and oil has risen to about 45 per cent of the total.

Shipbuilding Employment

Due primarily to the United States naval program of 1933 under which contracts for 37 naval vessels were placed with private shipyards and navy yards, it is gratifying to report that shipbuilding employment within our shipyards and navy yards is on the increase, although it is regretted that the private shipyards on the West coast and on the Great Lakes are not included in this statement. Reports of the National Council of American Shipbuilders show that while the private shipyard employment on July 1, 1933 in those yards engaged in building of sea-going vessels, was 10,400, by July 1, 1934, it had increased to 23,100. In August and September of this year, orders were placed for 24 additional naval vessels. There is, therefore, every assurance that employment on naval construction will continue to increase during the next year. To help stabilize conditions, it is hoped that the discrepancy now existing in

the hours of labor on government work in navy yards and the private yards will be removed.

Commercial Marine

For the first time since the war, United States has embarked upon a real naval program and if a balanced fleet is to be obtained the necessary merchant ship auxiliaries must be constructed. Here it is appropriate to recall that your first president, Clement A. Griscom, referred as a truism to the statement made long ago by an eminent British naval architect that no nation could maintain an efficient navy without a prosperous commercial marine to support it. For commercial purposes the vital need of such a merchant fleet is acknowledged by all familiar with the subject, and it is their earnest hope that the investigations now under way will clear away misunderstandings and lead to a practical solution in the shape of a definite plan for replacement by which there will be added to our merchant fleet each year a number of up-to-date efficient ships which is essential to the maintenance of our merchant marine and which would parallel the present plan of building up the navy. In this connection the President said recently, "that there need be no fear on the part of the shipping industry or others as to the intention of this administration to maintain an adequate merchant marine."

Aside from the economic need for merchant ships, scientifically designed and constructed, there is also a military need, in that a navy without a merchant marine is a navy in name only. Auxiliary cruisers, supply and repair vessels, transports, hospital ships, munition carriers, refrigerator ships, tankers, cable ships, etc., all are recruited from the merchant marine. There is at present a very serious deficiency in ships of proper type for a balanced naval auxiliary. Not only must the merchant marine care for the wartime needs of the navy, but it must continue to operate on essential trade routes.

Only superficial study of the subject is needed to reveal the fact that under present conditions, a naval mobilization, drawing as it would from commerce the tankers, cargo ships, etc., necessary for the use of the fleet, would result in seriously dislocating water transportation and in greatly reducing commercial supply and distribution of a vast number of commodities. The resulting effect on industry is difficult to envisage, but surely it would necessitate extraordinary efforts to avoid an economic upheaval of far-reaching effect.

Suggested Research

It has been stated heretofore, and I can only repeat, that there exists an outstanding public need for a research on a large scale into the economics of shipping. The problems are numerous and they present great complexity, so that I venture to suggest the research can be conducted to advantage only by a governmental agency or by the endowment of a research agency under one of the larger universities. Such a research should include all phases of water transport, its mechanics as well as its relationship with other transportation and with business in general.

The shipowner interests himself in the performance of his ship as a whole from an economic standpoint and this phase of the question has been studied extensively. However, the larger aspects of the problem, if broadly developed, might conceivably affect the conclusions in this regard, and it is with this phase of the research that the naval architect will be concerned.

This proposed research becomes of almost immediate importance for the reason that practically all of the ocean going general cargo ships under the American flag are from among those built during the war. On Jan. 1, 1934 there were 790 freighters actually in service in our coastwise and foreign trade fleets of which 640 were built during the war period. These ships soon will have to be replaced. Many of them already are economically unsatisfactory. These latter will require replacement at a comparatively early date, while all must be replaced soon.

The problem here that confronts the naval architect and shipbuilder is the design and construction of cargo ships, to replace these obsolete vessels, that will be able to compete in the world market for cargo.

Also a study of the phase of the shipping problem as affecting the national defense, and of the needs of the national defense and of its wartime effect on shipping, would constitute an important phase of the proposed research.

Merchant Marine Education

At the present time work is suspended by our committee, appointed in 1930, on merchant marine education. New York, Pennsylvania, Massachusetts and California operate training ships where students are trained in seamanship, navigation, engineering, and the other subjects pertaining to the profession; but the courses are short and not all of the ships are particularly well adapted to all of the work. The need for continued development is obvious. Recently the New York State Merchant Marine academy has obtained a shore base of 20 acres at Fort Schuyler and the plans for the future include additional equipment and an extension of the present two-year course. American boys from all states are eligible, subject to necessary qualifications.

The need for thoroughly trained and disciplined personnel on board ship, necessary to meet emergency conditions liable to occur at any moment is much too obvious to require further comment.

Safety of Life at Sea

The safety of life at sea convention, signed in 1929 by the representatives of 17 countries including our own, and forwarded to the senate in the fall of that year has not yet been ratified by the United States, although it has been accepted by the other maritime countries in the world and is, therefore, now in force. For reasons difficult to understand our senate has not taken action on an instrument which a selected delegation from this country signed with enthusiastic expectations of prompt approval. The society has done about everything it can do and we continue to hope not only for prompt ratification, but also that in the meantime our failure to ratify may not lead to serious international complication. Nevertheless, our new ships are being built up to the convention requirements.

The MORRO CASTLE disaster may be the immediate cause for the adoption of two safety of life at sea features which should be demanded by the public. The first one is covered by article 25 of the 1929 convention that "special duties for the event of an emergency should be alloted to each member of the crew" and article 48 that "all ships shall be sufficiently and efficiently manned." If we have the wisdom to ratify the convention, and the necessary efficient inspection service to compel compliance with its requirements, even if that means, as it well may, a change in our present law, the result can be accomplished. The second one which is not in the convention, but which is perfectly practicable and which probably would be written in the next convention if we made it a law in our country, is that all new ships should be fireproof, and that changes be made in existing ships to make them as nearly fireproof as practicable and reasonable. The primary reason for a fireproof ship is humanitarian, but the subject has also an economic aspect.

Experimental Model Basin

Some thirty-five years ago our then new experimental model basin in the Washington navy yard was the best equipped one in existence. By a wise provision of the law it was made a national tank, available alike for the work of private corporations and of the government. At the present time every maritime country in Europe has far more modern, up-to-date and scientific model basins.

This society for some years has advocated the construction of a new national ship model tank. Other technical societies and associations interested in shipping have done

likewise. The need for such a tank is outstanding and all of those who are informed as to the situation are agreed as to its importance to the merchant marine, both oceangoing and inland waterways, as well as to the navy.

The navy department has selected a site and has completed plans and specifications for construction of the tank and its attendant buildings and facilities. (Two illustrations accompany the address—editor's note).

There are to be four model testing basins—one 1600 feet long for sea plane models and friction tests, one deep water basin and one shallow water basin for ship model tests, and one basin for steering and rudder tests; also a shop building for the fabrication of models and testing equipment, a laboratory building for testing materials and ship's structures and for making propeller tests, an office building for personnel, drafting rooms, and photographic laboratory, a building for the two wind tunnels and the power plant building.

It is to be noted that this is a national project as it involves all shipping and aeronautic interests. Also, it is to a large degree a self-liquidating project, as all tests, etc., for individuals or private companies are done at cost for the individual or company. Everything is ready to proceed and there is lacking only the allotment or authorization of necessary funds. I know of no single project that would do more to promote the art and science of shipbuilding, which is the prime object of this society, than the construction of such an up-to-date model tank.

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Technical Papers Presented

TWELVE papers were presented during the two days' meeting of the Society of Naval Architects and Marine Engineers, Nov. 15 and 16. These papers and all of the discussions will be published in full in Vol. 42 of the transactions of the society which should be ready for distributon sometime prior to June, 1935. Titles of the papers, names of the authors and brief abstracts follow:

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1. Robert Fulton's Original Drawings, by Frederick D. Herbert, member.

The author in his foreword to this paper said in part:

A valuable set of Robert Fulton's patent drawings was recently discovered in London when the offices of *The Engineer* were being moved to a new location. These drawings were brought by the writer to this country as a gift from *The Engineer* to the American Society of Mechanical Engineers. After cleaning and mounting, they were shown to several members of our society and, because of their great historical value, it is deemed wise to place them in the form of a permanent record in the transactions of our society; therefore, the most important sixteen of the set of twenty drawings are reproduced in this paper. The originals are tinted drawings 30 inches by 20 inches.

In a letter announcing the discovery of the drawings and offering them to the American Society of Mechanical Engineers, Loughman St. L. Pendred, editor of *The Engineer*, stated that he had submitted the drawings to H. W. Dickinson, keeper of the Science Museum, South Kensington, and honorary secretary of the Newcomen Society for the Study of Engineering and Technology.

Mr. Dickinson at once advised him that the collection was a wonderfully and wholly unexpected find. The drawings are in fact duplicates of those made by Fulton on his patent specifications.

Then followed an interesting memorandum prepared by Mr. Dickinson, who is the author of *Robert Fulton, Engineer and Artist*, published in London in 1912.

♦ ♦ ♦

2. Ship Structural Design, by Edward F. Spanner, member.

This paper concerns three groups of suggestions in connection with the construction of ships aiming at (1) modification of certain of the main structural features of ships in a manner likely to prove of advantage against collision risks, (2) rearrangement of the shell and double-bottom structure in a manner likely to render vessels more thoroughly protected against underwater damage, and also more easily constructed by electric welding, and (3) improvement in operation of the pumping power available in a ship in emergency.

These three main headings are generally related to the constructional safety of ships at sea. They merit consideration at one and the same time, since the ideas and principles involved are intertwined so closely that it is only by taking a comprehensive survey of the whole series that a proper estimate can be reached in regard to the value of the several individual proposals offered for comment.

Briefly, the first group of suggestions contains proposals for:

(a) The re-design of the bow structure of all future vessels in a manner which will eliminate the possibility of the bow of a ramming vessel cutting deeply into the side of another ship into which she may run.

(b) The re-design of beam-frame connections along lines which will ensure that, in future, there shall be no weakness in the link between beam and frame such as frequently permits of collapse of the side and deck plating under the shock of collision.

(c) The re-design of bulkhead stiffening members and connections and the adoption of principles of continuity in bulkhead stiffening which should safeguard bulkheads against overstraining in emergency flooding conditions.

The second group proposes:

(a) A novel arrangement of ballast and fuel and or feed tanks which will have the effect of benefiting the ships treated by so disposing these tanks that they will be much more effective than hitherto in providing safeguards against certain important types of risk, without detracting from the general efficiency essential to fluid storage and pumping systems in modern tonnage.

(b) The production of a type of ship construction which shall be better adapted to the extended use of electric welding than is the normal double-bottomed ship.

(c) The arrangement of longitudinal stiffening in single-skin ships and ships which virtually become single skin ships when designed in accordance with some of the foregoing proposals, in such a manner that there will be greater flexibility in the shell plating and a greater chance of shocks and overload stresses being absorbed without fracture of the shell plating.

The third group of proposals deals with:

(a) Methods of improving present conditions by improving bilge-pumping systems.

(b) The provision of facilities by means of which the whole of the pumping power can be rallied to assist in dealing with inflow of water following serious damage.

The author is an English naval architect. He suggests that advance in ship design and construction can never be general until a periodical survey is made in order to determine how far new proposals can be made to serve practical ends.

♦ ♦ ♦

3. The Efficient Length for a Given Form and Speed, by L. A. Baier, B.S., member.

In this paper the author, who is assistant professor of naval architecture and marine engineering at the University of Michigan, has undertaken to determine the efficient length for given form and speed.

He points out that considerable attention is given in the modern text on ship form resistance to the necessity of choosing the operating speed of a vessel such that this speed will be located in the hollow rather than on the hump of the resistance curve.

In conclusion the author states in part: It appears from the above analysis that for a given form and a required speed there is a definite length (displacement and sail area), which will drive easier than a short-

er or longer boat of the same form. The most successful design, then, is where the form is such that the most efficient length corresponds with the length required and, in the case of sailing vessels, that the wind velocity corresponding to this length will be the actual wind velocity encountered at the time of racing. This accounts for one of the reasons why certain yachts are faster or slower than competitors under varying wind conditions. Other reasons are that the righting moment increases with size faster than the heeling moment, allowing the larger vessel to carry sail with less relative heel than the smaller vessel and hence with less resistance. Also some vessels sail differently on the wind than before the wind.

While the writer is keenly aware of the many limitations as to dimensions usually imposed upon the naval architect due to stability, cost, draft, or yacht racing rules, nevertheless, there are occasions where a simple expansion of dimensions would result in decreased power and increased deadweight capacity. It is, therefore, hoped that this extended use of tank test results of models may prove of interest and value.

This paper contains many diagrams and a number of tables. Examples are also given showing the application of his model test analysis to a fire boat and a cargo and passenger steamer.

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4. Recent Developments in Propeller Design, by Karl E. Schoenherr, Dr. Eng., member.

The foreword to this paper which follows in full is a clear explanation of its scope:

The first successful screw propellers were patented by Francis Pettit Smith and John Ericsson in 1836. These inventions were rapidly developed and applied, so that by 1850 screw propellers and screw wheels were in common use for ship propulsion on both sides of the Atlantic. In the early days progress in propeller design was achieved mainly through the imagination of inventors and by the method of trial and error, because neither an adequate propeller theory nor the means to carry out experiments otherwise than on the ship itself were available. With the introduction of model basins, however, the situation changed. Apparatus was developed to test and study propeller performance by means of small-scale models. By this powerful method the influence of the different variables was determined, so that soon it became possible to select the most efficient propeller for any given set of conditions.

While thus the practical side of the problem had been solved in a fairly satisfactory manner, the theoretical side had lagged behind. The early theories by Rankine (1865) modified by R. E. Froude in 1889, by W. Froude (1878) and by Greenhill (1888) taken together had laid a firm foundation, but were quite incomplete and incapable of accounting for all the phenomena of propeller action. The subsequent work by D. W. Taylor and the theories by Lorenz (1905) and Guembel and Reissner (1910) filled in many of the existing gaps. It was not, however, until Grammel (1916) and Foettinger (1918) had introduced an entirely new viewpoint, by taking account of the vortices in the slip stream of the propeller, that the ground was prepared for a satisfactory propeller theory. This was finally developed in the next ten years by Betz, Prandtl, Helmbold, Pistolesi, Bienen, v. Karman, Glauert, Kucharski, and others.

The purpose of the present paper is to present to the members of this society the salient points of this latest theory and to show how it can be applied in practical design work. In the first part of the paper the theory is presented essentially as developed by Betz, Prandtl and Helmbold, worked up from the sources given in the bibliography. In the second part a simple method is given by which the application of the theory to practical design work is greatly facilitated. This method is one that was developed by us some five years ago and used repeatedly in practice. To illustrate its use, an example has been worked through. Finally, the advantages of the new method are discussed, and it is shown that by means of it substantial improvements in propeller efficiency can be obtained.

The author is connected with the United States experimental model basin, Washington. This appears to be a valuable contribution to the practical design of propellers, and the author is of the opinion that the method developed is capable of giving results which compare favorably with those obtained by any other design method, and that this fact combined with the other advantages of the method, some of which are unique, will undoubtedly gain many adherents for it in the future.

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5. Measurement of Propeller Thrust on Shipboard, by Commander H. E. Saunders (CC), U.S.N., council member.

This paper, which is 29 pages in length, with numerous illustrations, begins with the following statement:

Although measurements of propeller thrust were first made not long after the general introduction of the screw propeller, so little was known of the behavior and characteristics of the propeller and of the interaction between propeller and ship that a determination of thrust meant little to the designer or builder of the vessel and her machinery and still less to the owner and operator of the ship. If the power plant could develop the specified horsepower, and the ship make the required speed, all hands were satisfied, and they continued to be satisfied throughout a long period of development in the design of the propeller, during which a decrease in power or an increase in speed continued to represent the primary goals to be attained.

Until after the beginning of the present century, the power developed by the reciprocating steam engine of a ship was measured by indicators applied to its cylinders. It was not until engines of this type were employed extensively for driving electrical generators ashore that engineers began to inquire as to the horsepower actually delivered at their shafts. Similarly, it was not until the extended use of the steam turbine, with its more or less uniform turning movement, made possible the development of a simple torsionmeter, that shaft horsepower instead of indicated horsepower became the measure of the output of a ship's propelling machinery.

In the meantime, however, a few inquisitive minds endeavored to determine how much of the shaft horsepower was being turned into useful work by the propeller, and how efficiently the propeller was developing the thrust necessary to drive the ship through the water. Included among these few were experimenters who devoted their time largely to research problems on resistance and propulsion which they hoped to solve by the use of models. The elder Froude, a renowned pioneer in model research, developed a dynamometer for measuring the thrust of a propeller, but it has not been possible for the author to unearth a description or drawing of this device. Most of the investigators made only sporadic attempts at the development of a reliable and serviceable thrustmeter for use on shipboard, limiting their efforts to a single type or design. Bauer, on the other hand, tackled the problem in comprehensive and systematic fashion in Germany, and it is to be regretted that, largely through circumstances over which he had no control, his efforts were not rewarded with the complete success which they deserved.

In concluding this paper, which is a very complete treatise on the subject, including summaries of the more important attempts made to measure propeller thrust, the author states that he regrets that his survey did not enable him to present a more optimistic view of the thrustmeter situation, and he hopes that the read-

er will not look upon it as in any sense discouraging. This study, undertaken on the basic premise that thrustmeters are precision trial instruments only, is in a sense unfair both to the instruments described and to their designers, since it presupposes requirements which were probably never specified for the thrustmeters when they were built and performances which were never expected of them in service.

The development of thrustmeters for shipboard use has, after all, engaged the attention of but relatively few people and those few have not had the time, the facilities, or the opportunity to push their lines of development to a satisfactory and final conclusion. It is to be expected that a continuation of the effort put forth in the past few years to obtain ship trial data of a high degree of accuracy and reliability will be accompanied by the continued development of appliances for measuring propeller thrust and by the use of these instruments for gathering data on types of ships on which little authentic information of this kind is now available.

♦ ♦ ♦

6. Development in Ground Tackle for Naval Ships, by Rear Admiral E. S. Land, (CC), U.S.N., vice president.

In this interesting paper, Admiral Land has given the society information on tests conducted by the navy department. He states that, It is not considered that they were numerous enough to justify radical departures from practices which have been in vogue for a number of years and proven satisfactory on a great variety of ships. However, sufficient data have been obtained to justify some change in the ground tackle furnished vessels with the idea in view of saving an appreciable amount of weight and at the same time increasing the holding power of the ground tackle.

With this end in view the size of chain designated for naval vessels now building is somewhat smaller than that which would have been furnished had they been designed several years ago; also, these vessels will be furnished anchors of the improved design. In the meantime the tests with which this paper deals will be continued until a sufficient amount of data on this subject is available to justify a further change in practice.

Importance of Weight Saving

Naturally, the bureau of construction and repair has a technical and professional interest in the subject of ground tackle for naval vessels. In recent years this interest has been particularly enhanced on account of the weight limitations prescribed by naval treaties, of which the United States is signatory.

The question of weight has always been one which has its home plate located in the bureau of construction and repair. The treaty limitations have made this question of far more vital importance than ever before. This in turn requires refinements of design in hull structures not otherwise considered of particular importance.

The ultimate object of a man-of-war is to carry an offensive weapon to the enemy. Every pound saved, either in hull design or machinery design, permits the utilization of this saving in the armament of a vessel.

I should like to impress upon every member of this society the great importance of weight saving in our designs. This matter is not only of importance in our merchant marine building, but also of vital importance in our naval building.

♦ ♦ ♦

7. Ventilation of Ships, by John F. Nichols, member.

In this paper which deals with the important problem of ventilation, the author, who is chief engineer of the Newport News Shipbuilding & Dry Dock Co., includes the following, with reference to air conditioning:

A comparatively recent development in connection with ships' ventilation has been the application of what for lack of a better term is called "air conditioning." The results have been so gratifying and so acceptable to the traveling public that air conditioning has become practically a necessity on any new passenger vessel, especially one designed to operate in the tropics, and its application is also being rapidly extended to existing vessels.

Air conditioning has been defined as the treatment and control of air with respect to temperature, water vapor content, purity, distribution and motion. Properly speaking, air conditioning includes the warming and humidifying of the air when it

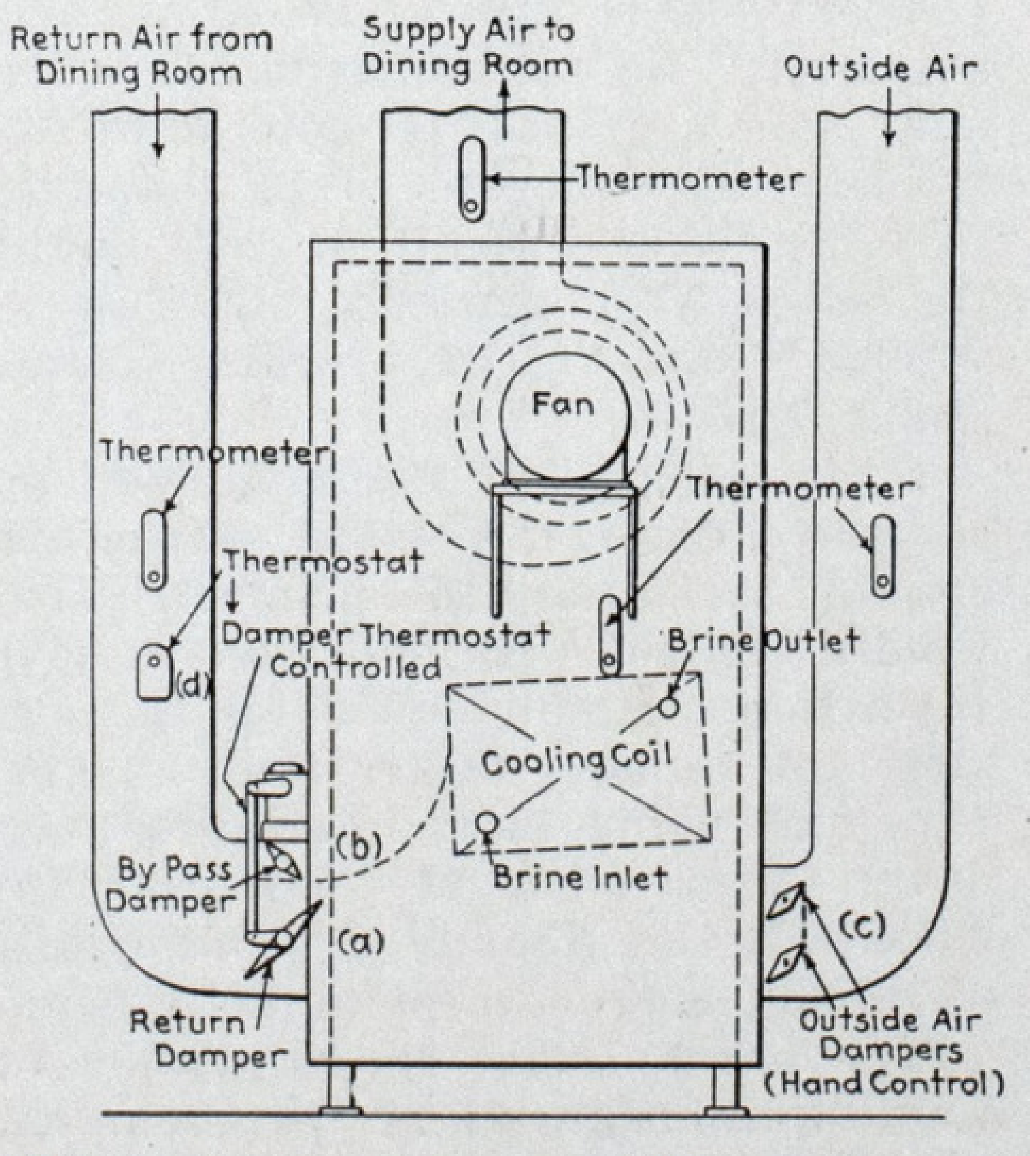

Fig. 1—Type of air conditioner in general use for larger spaces

is too cool for comfort as well as cooling and dehumidifying the air when too warm. The first phase has been discussed under the section on "air heating"; the present discussion will be confined to the second phase, viz. air cooling.

In summer weather we are uncomfortable both by reason of high air temperature and frequently (this is usually the case at sea) because the humidity is so high as to retard the evaporation of perspiration from the skin which is essential for comfort. Consequently, the problem is both to cool and to dry the air.

In order to reduce the amount of refrigeration that would otherwise be involved, some scheme of recirculation of the air is necessary and this in general restricts its application to spaces in which the doors and windows may be kept closed. Successful installations on new vessels have been made in this country to the first-class dining rooms of the MARIPOSA and her two sister ships, to the

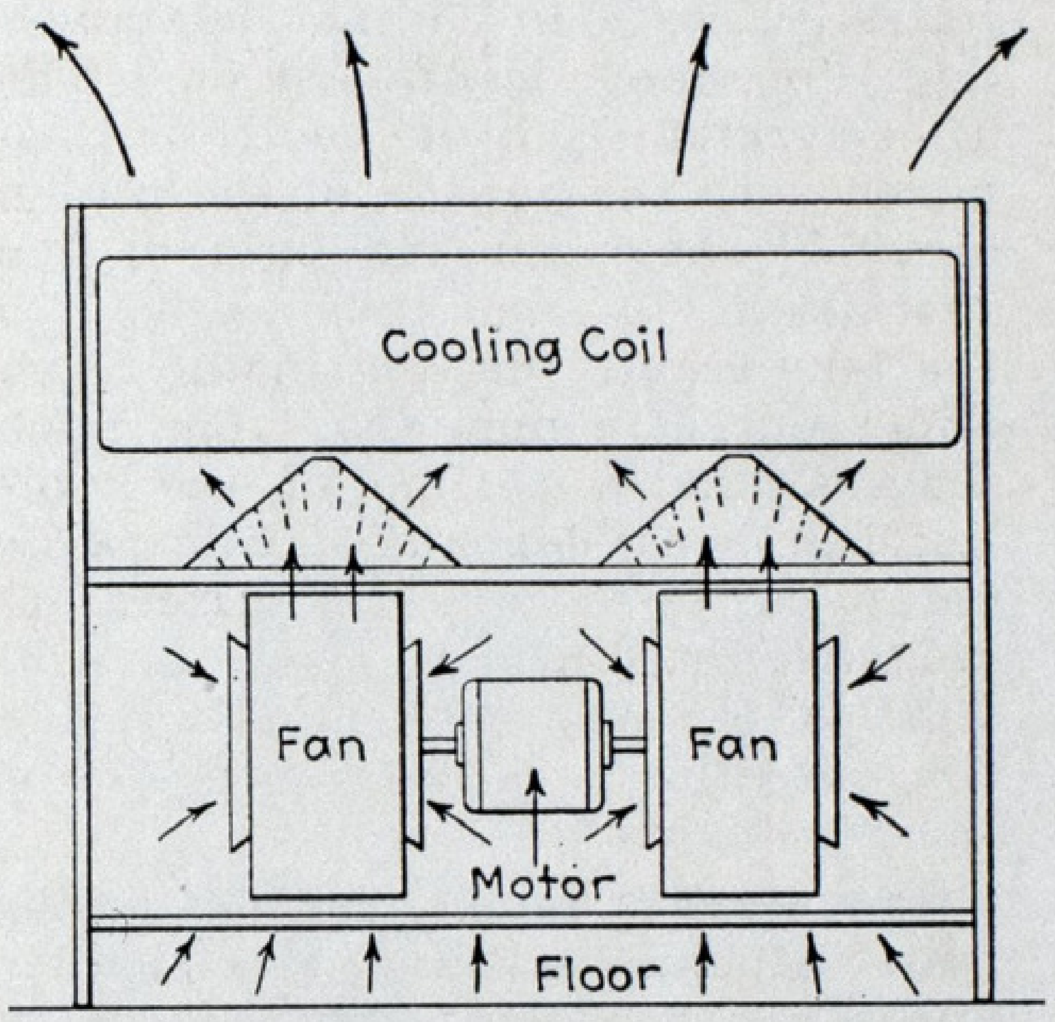

Fig. 2—Air conditioning apparatus for individual staterooms

main tourist dining rooms of the MANHATTAN and WASHINGTON and to the dining rooms of the COLOMBIA and HAITI.

In addition to the above, at the date of writing this paper, air conditioning has recently been added to the main dining rooms of the CALIFORNIA, VIRGINIA and PENNSYLVANIA of the Panama Pacific line and to several yachts. The application to foreign vessels has so far been very limited.

While the application of air conditioning to date has been confined mainly to dining roms, the results are such that we may confidently look forward to its extension in the near future to other spaces, probably at first to the de-luxe suites and later to other public rooms, though in these latter spaces special problems will arise in connection with the necessity of keeping doors and windows closed.

In the practical application of air conditioning the cooled air is introduced through specially formed outlets near the top of the room. The endeavor is to lay down a blanket

of conditioned air without perceptible drafts. This cooled air gradually sinks and is exhausted through ducts in or near the floor, and, after being cooled and mixed with a proper amount of fresh air, is returned to the room. A temperature differential between the room and the outside air of about 10 degrees Fahr. is generally maintained and found satisfactory. As the effect is felt immediately, it is only necessary to use the cooling apparatus during meal hours, the system being started about one-half hour before meal time and shut down immediately after the passengers leave the room.

The sketch in Fig. 1 shows the type of conditioner in general use for the larger spaces such as dining rooms.

The return air from the room is divided into two streams "a" and "b." The return air "a" as well as the fresh outside air, which enters at "c" pass through the cooler which reduces the temperature of the mixture to the dew point and so precipitates a portion of the contained moisture which is drained off. The air emerging from the cooler is then mixed with the portion of the return air "b" under the influence of the thermostat "d" and thus warmed to the temperature desired in the room and reduced in humidity. For some installations, a portion of the cooling has been done by a cold brine spray, but this system has certain objections for shipboard use. In cold weather a steam heating coil inside the conditioner is used instead of the cooling coil.

For smaller rooms, such as suites and individual staterooms, a simpler apparatus as shown in Fig. 2 is quite adequate. In this apparatus the room air is continually recirculated by an internal fan and the desired amount of fresh outside air is admitted to the room through the regular ventilation supply terminals.

While the amount of refrigeration must be calculated for each individual case, based on the amount of heat generated by lights, warming tables, personnel and the incoming air, in general it will be found that one ton of refrigeration will be required for about 1250 cubic feet of public room space and about 2000 cubic feet of stateroom space. While the refrigeration for the larger type of conditioners is in general supplied from the ship's main refrigerating plant, it will probably be found advisable to fit small self-contained automatic refrigerating machines to serve individual conditioners, especially when they are at a distance from the main plant.

♦ ♦ ♦

8. Some Examples of Arc Welded Ship Construction, by David Arnott, member.

To the American Bureau of Shipping, of which the author of this paper is the chief surveyor, must go no inconsiderable part of the credit for the progress made in recent years in the application of arc welding to ship construction. This is a very valuable review by practical example of the advances made in the use of arc welding in the marine field. The paper which is 38 pages in length is profusely illustrated with both photographs and line drawings of the vessels described.

A few selected excerpts from this paper follow:

Electric arc welding in the shipyards of the United States has reached that stage of development where it is rapidly becoming a serious competitor to riveting in the construction of certain classes of merchant ships. In these circumstances it is felt that a paper giving particulars and showing the structural arrangement of some small all welded ships recently built in this country would be of interest to the members of this society and will serve to promote or provoke a useful discussion on a subject of increasing importance to naval architecture.

The paper is written from the point of view of the naval architect whose primary interest in welding is the economics in cost and weight of material likely to be effected by the new process without sacrifice of structural efficiency, rather than that of the welding engineer.

Costs, Welding, Riveting

Contract price is not always a criterion of actual cost so that only those shipbuilders with experience of building both welded and riveted vessels of the types described can give any real idea of comparative cost. It is probably safe to suggest that a welded barge of rectangular section can now be built somewhat cheaper than the corresponding riveted job, but that the cost differential in favor of welding will be less or may entirely disappear if the hull is of ship shape form, especially if the plating seams are flush, owing to the increased difficulties in erection and the necessity for carcful fitting. Larger vessels cannot be so readily assembled in pre-constructed units, and, since a greater proportion of the welding will require to be done on the ship, it is difficult to conceive of the labor cost working out less in welded ships of the ordinary ocean going type.

It is perhaps a commonplace to suggest that the ship structure should be designed primarily for welding, but it will nevertheless bear repetition. Reducing as far as possible the number of structural members and using large plates to keep down the number of joints and incidentally the amount of welding will obviously make for economic design.

The proper place for education in welding to begin is in the technical schools or colleges from which our technical staffs are recruited. Our shipyard draftsmen should not be content "to leave it to the welder," but should make themselves familiar with the fundamental principles underlying welding design, and also keep in touch with practical developments in allied industries.

Electric arc welding has developed along sound and conservative lines to a stage where we have available a method of joining structural parts which is superior to riveting. The process has come to stay and a gradual extension of its application in merchant ship construction can be confidently anticipated. Continuous research and technical investigations have resulted in a tremendous advance in welding equipment and welding technique, but there still remains a wide field for investigation in connection with fatigue and stress concentration in welded joints. In this scientific age, we have to learn to a large and increasing extent from the experience of others. In this connection valuable educational work is being done in this country by the various committees of the American Welding Society.

♦ ♦ ♦

9. The Battle Cruiser, by Commander H. E. Rossell, (CC), U.S.N., member.

The author is professor of naval construction at the Massachusetts Institute of Technology. In this interesting paper he has given an historic outline of the development of the modern battle cruiser. The paper is nine pages in length and is illustrated by photographs of the British battle cruisers, HOOD and RENOWN, the first being the largest and most powerful ship of this type ever built. An artist's sketch is also shown of the French battle cruiser DUNKERQUE now under construction. One of the three Japanese battle cruisers, the KIRISHIMA is also shown.

A very interesting analysis is presented of the part played by battle cruisers in the World war. The battle of Heligoland is referred to as an illustration of one of the important functions of battle cruisers in supporting light cruisers in an engagement with vessels of similar type. At the battle of the Falkland islands two battle cruisers of the INVINCIBLE class won great prestige for this type. An analysis is also made of the actions of Dogger Bank and Jutland. In the latter instance the battle cruiser demonstrated additional functions where high speed and great offensive and defensive power were of great value.

In conclusion Commander Rossell states:

The imminence of the termination of current armament treaties make the present an appropriate time to study merits and shortcomings of all types of warships. If past experience be a reliable guide, we may expect future naval wars to develop

many situations where ships of great offensive and defensive power and with high speed will be in urgent demand. These characteristics are peculiar to but one type of ship, the battle cruiser. Large navies of the near future will be at a disadvantage without vessels of this type.

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10. **Marine and Naval Boilers,** by Capt. C. A. Jones, U.S.N., member, and Lieut. Commander Thorvald A. Solberg, U.S.N., visitor.

The authors are particularly well qualified to discuss the subject of this paper. Captain Jones is head of design and construction division, bureau of engineering, navy department, and Commander Solberg is officer in charge, naval boiler laboratory, navy yard, Philadelphia.

The following excerpts are quoted from the paper:

The purpose of this paper is to discuss broadly the various aspects of the design and application of boilers for marine and naval purposes. Because of the complete adoption of watertube boilers by the navy and the rapidly increasing trend toward their use for merchant vessels, only this type will be considered.

It can be stated that as far as the navy is concerned, practically all new and modern vessels will be boilered with some design of small tube express boiler. In the merchant marine it appears that there is a definite trend toward some type of watertube boilers, and in the case of the higher power, combined passenger and cargo carrying ships, there seems to be an indication favoring the lighter small tube express boiler. This is exemplified in the case of the Foster-Wheeler A type boilers installed on the Grace line steamships SANTA ELENA and SANTA PAULA and the Babcock & Wilcox boilers used in the United States line steamships MANHATTAN and WASHINGTON.

There have been two recent developments in sectional-header boilers; the use of small straight tubes between the conventional headers, and the use of small curved tubes between cylindrical headers in a design known as the SX boiler.

With the adoption of higher steam pressures and temperatures, some form of small tube express type boiler is a necessary part of the modern installation. The principal advantages of sectional-header steam generators are their comparative simplicity of design, ease of cleaning on both fire and water side, and facility of incorporating integral superheaters between passes or as inter-deck units.

On the side of definite advantages for the three-drum (A-type) or similar express boilers may be listed the following:

(a) Concentration of greater boiler water heating surface in the same space at less weight (lower space and weight factors).

(b) Greater structural strength per se.

(c) Baffling within tube nests is unnecessary.

(d) Excessive number of openings (handholes) obviated; therefore less cost of material for overhead.

(e) More rapid steaming and more rapid response to load fluctuations.

(f) Some designs permit greater flexibility in burner arrangement and provide better flame support for complete combustion.

(g) Ability to stand forcing with resultant high rates of evaporation.

In conclusion it may be stated that although considerable improvement has been made in boiler performance during the past ten years there is still considerable room for refinement of design and investigation work looking toward general improvement in boiler performance. With the use of high pressures and temperatures firmly established, it is predicted that the next ten years will see changes in marine and naval boilers equally as great, and perhaps entirely different from those of the past decade.

There are, however, at least two vital reasons for the slow progress in the development of the marine boiler. First, a major casualty usually results in a large loss of life, and, second, conclusive experimental work must be carried out on full scale and this is an extremely expensive matter.

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11. **Bunker Fuel Oil Problems,** by Capt. C. A. Jones, U.S.N., member, and Lieut. J. E. Hamilton, U.S.N., visitor.

This is a valuable paper in calling attention to the desirability of study and investigation of the properties of bunker fuel oil for the purpose of improvement in quality and to obtain a better knowledge of methods of firing to obtain satisfactory results.

The authors point out that: The refiner's objection to a close specification for fuel oil is that his products vary over wide limits in characteristics, some of which neither he nor anyone else fully understands. He can accept a standard of classification which is about the best which has been generally imposed to date. With such a standard, formerly based on gravity but now largely on viscosity, a refiner could in effect do either of two things.

First, he could run all of his fluid by-products into one set of tanks, putting them in whatever class they proved to belong by tests, and market but one class of fuel oil, or second, he could by maintaining any number of sets of tanks test his fuel oil products upon production and then run them into the group of tanks to which they belong and then market as many classes as he produced.

Fuel Oil Investigation

It is realized that results gained to date from the fuel oil investigation are not concluusive and ar far from having proved practicable applications. Certain very clear indications show the desirability of carrying on the investigation indefinitely. To this end the first step has been taken of consolidating all research, tests and development work in connection with fuel oil at the naval boiler laboratory.

It is expected that the work of the laboratory in connection with fuel oil rather than with equipment will follow four general lines. These are:

1. Further study of the data presented in this paper.

2. Continued efforts to analyze further the A_1 to A_{18} samples. Possible methods to be studied are:

(a) Gravitational separation followed by analysis of the fractions;

(b) Fractionation by distillation followed by analysis of the fractions; and

(c) Fractionation by solution followed by isolation and analysis of the fractions.

3. Continuous service tests of additional samples for obtaining more data and for testing conclusions reached on previous data.

4. Possible improved methods of control of atomization of fuel oil.

♦ ♦ ♦

12. **Safety in Design of Small Tankers,** by Martin G. Kindlund, member.

The author is a partner, Kindlund & Drake, naval architects, New York. The following excerpts are quoted:

It is the purpose of this paper to review the hazards connected with the transportation of gasoline and other highly volatile petroleum products, and to consider means whereby these hazards may be minimized or eliminated.

Particular attention has been given to vessels of the harbor type and others engaged in the delivery of petroleum products. The question of safety against fire and explosion appears to be of greater general interest and importance in the case of such vessels than in the case of large ocean tankers.

There are several reasons why this is so. First, they are more numerous; second, they load and unload more frequently; third, they operate in waters adjacent to centers of population and industry; fourth, the cost of installing and maintaining safety equipment is relatively greater; fifth the personnel is usually less intelligent and experienced and subject to more frequent changes; sixth,

(*Continued on Page* 40)

SHIP INTERIORS,

Construction to Prevent Spread of Fire

BY R. T. GRIEBLING

ALMOST every possible device which can insure the safety of passengers at sea has been used by steamship lines in the past. As new safety devices are invented, they are quickly adopted. There is hardly a group in any field of human endeavor which has so conscientiously discharged its responsibility toward its fellow man as the body of men who follow the call of the sea.

Safest of all modes of transportation is travel by ship. It is so much more shocking, then, to hear of a disaster the size of the MORRO CASTLE, where, according to official report, 114 persons lost their lives and 10 are missing. The disaster was caused by a fire, of unknown origin first detected in the library of the first class passenger accommodation. In a trice the superstructure amidship was a mass of roaring flame preventing passengers and crew from any concerted or orderly movement to their assigned lifeboat stations.

The President Expresses Wish

This catastrophe so seared its way into the national consciousness that President Roosevelt expressed a wish for legislation in the coming congress which would make the fireprofing of United States vessels obligatory.

The proposed legislation would provide for the further improvement of ship interiors over and above the fire safeguards already in force. It would deal among other things with the arrangement, design, construction and materials of partitions and bulkheads so that they would more effectually hinder the spread of fire.

All ships have steel partition-bulkheads running transversely through the vessel at regular intervals. Many naval architects, and others who have studied the question, feel that the spaces between these main fireguards are too great, and that they should be reduced in order to make these firefighting walls more efficient.

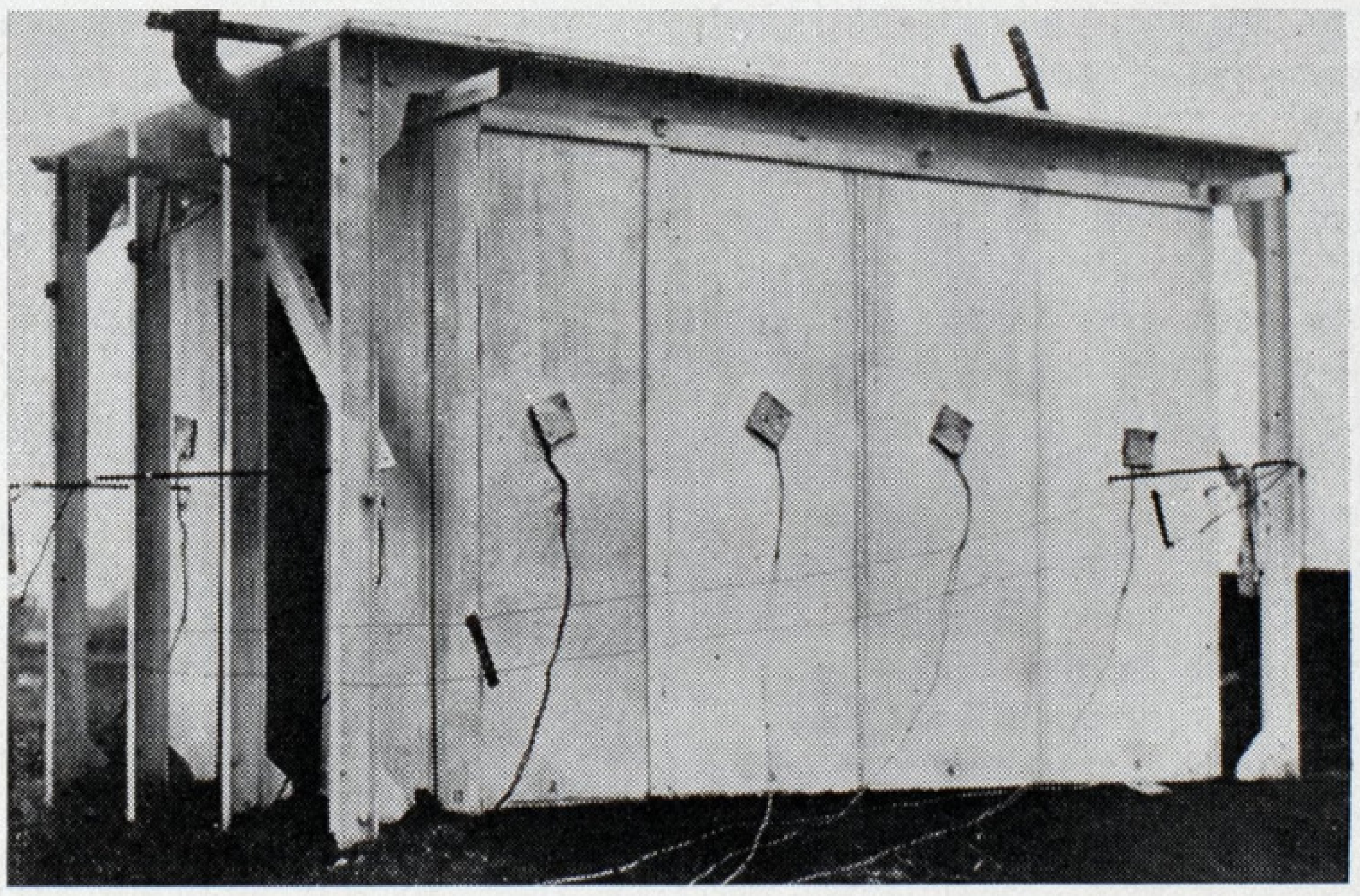
Customary Construction

Partitions between passenger cabins have in the past usually been made of wood or composition material treated with fire-retardant chemicals. Its general use is principally due to its light weight, but while it resisted fire to some degree, it would eventually break down and let fire through to the next enclosure. Such progression could keep on until all walls in the passenger quarters had been broken through, when the fire would have unhindered access to the destruction of the rest of the ship.

Passenger quarters are mentioned advisedly because serious fires aboard ship usually start in passenger quarters and not in the cargo spaces. The latter are belowdecks and are separated by watertight bulkheads which are capable of withstanding high temperatures for a long period of time. These compartments can be sealed and flooded with water, steam, or a non-combustible gas, such as carbon dioxide, and the flames may be extinguished without danger to passengers, crew, or the rest of the ship.

Passenger Quarters

But in the passenger quarters one may find complex lighting fixtures, ample ventilation, a wealth of combustible material, and the ever-present hazard of human carelessness. These quarters cannot be flooded with an inert gas, partition doors cannot always be closed because they might trap some passenger, and ventilation — the life of every fire — is a thousand times more prevalent in passenger accommodations than in the hold of the vessel.



Sample stateroom, built under the direction of George G. Sharp, to test the fire resistant properties of various kinds of partition paneling. The panels were of metal, wood and composition

Sample stateroom, after fire had raged for one hour and five minutes. Only metal panels stood up under a blaze which ranged from 1300 to 1800 degrees Fahr.

It is of paramount importance to ship-owners to make passengers as safe as possible. In the past this has been done in a number of ways. First of all, responsible lines have always insisted on fully qualified officers and crew, in which all members were imbued with their responsibility to take care of passengers in time of danger.

Fire detection and fire alarm apparatus is compulsory on board all ships, and every modern large steamship has a special crew of firemen whose sole duty it is to patrol the ship and to fight fires when and as they occur. Other mechanical de-

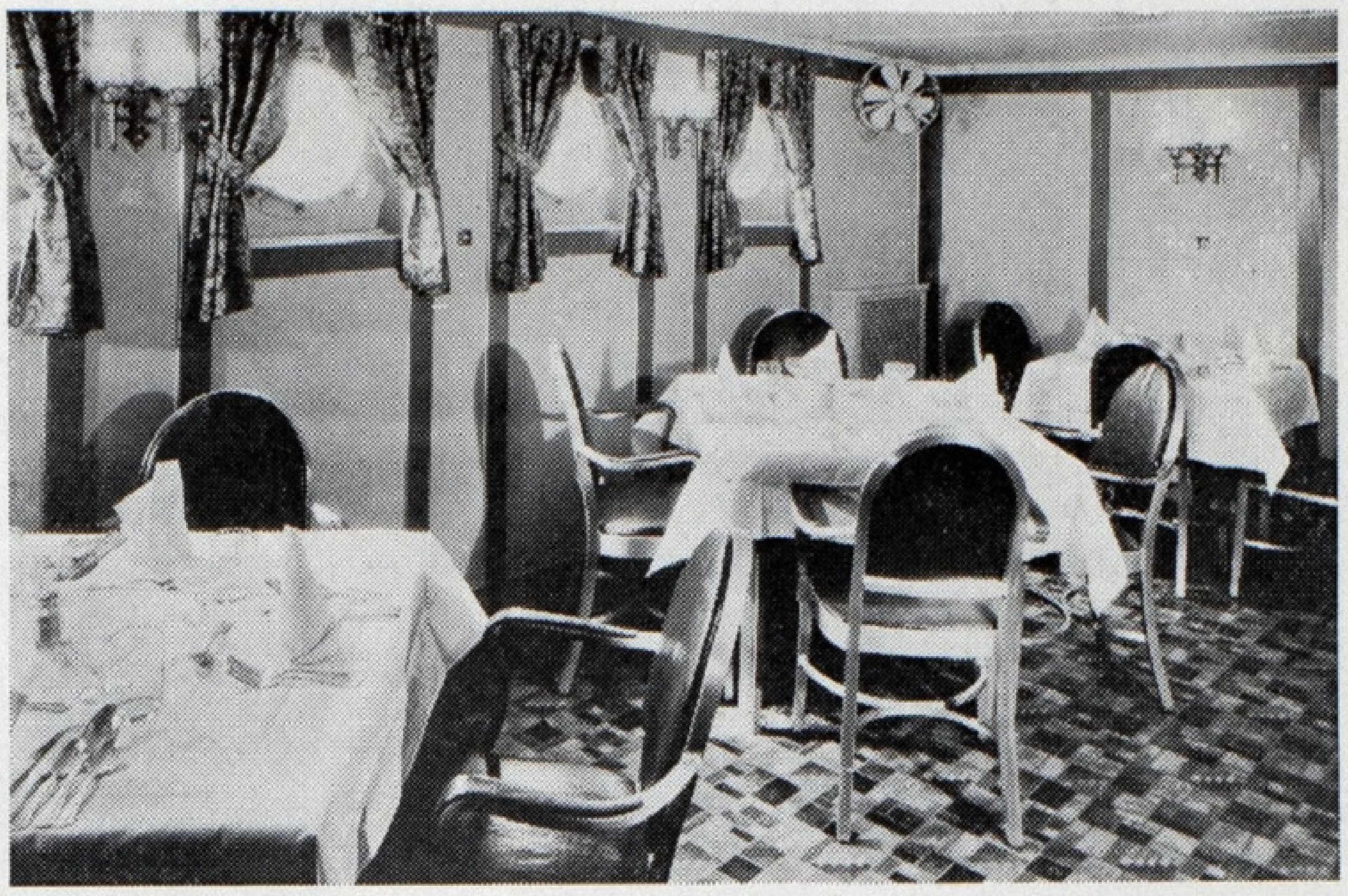
The author, R. T. Griebling, is with the Aluminum Company of America, Pittsburgh, Pa.

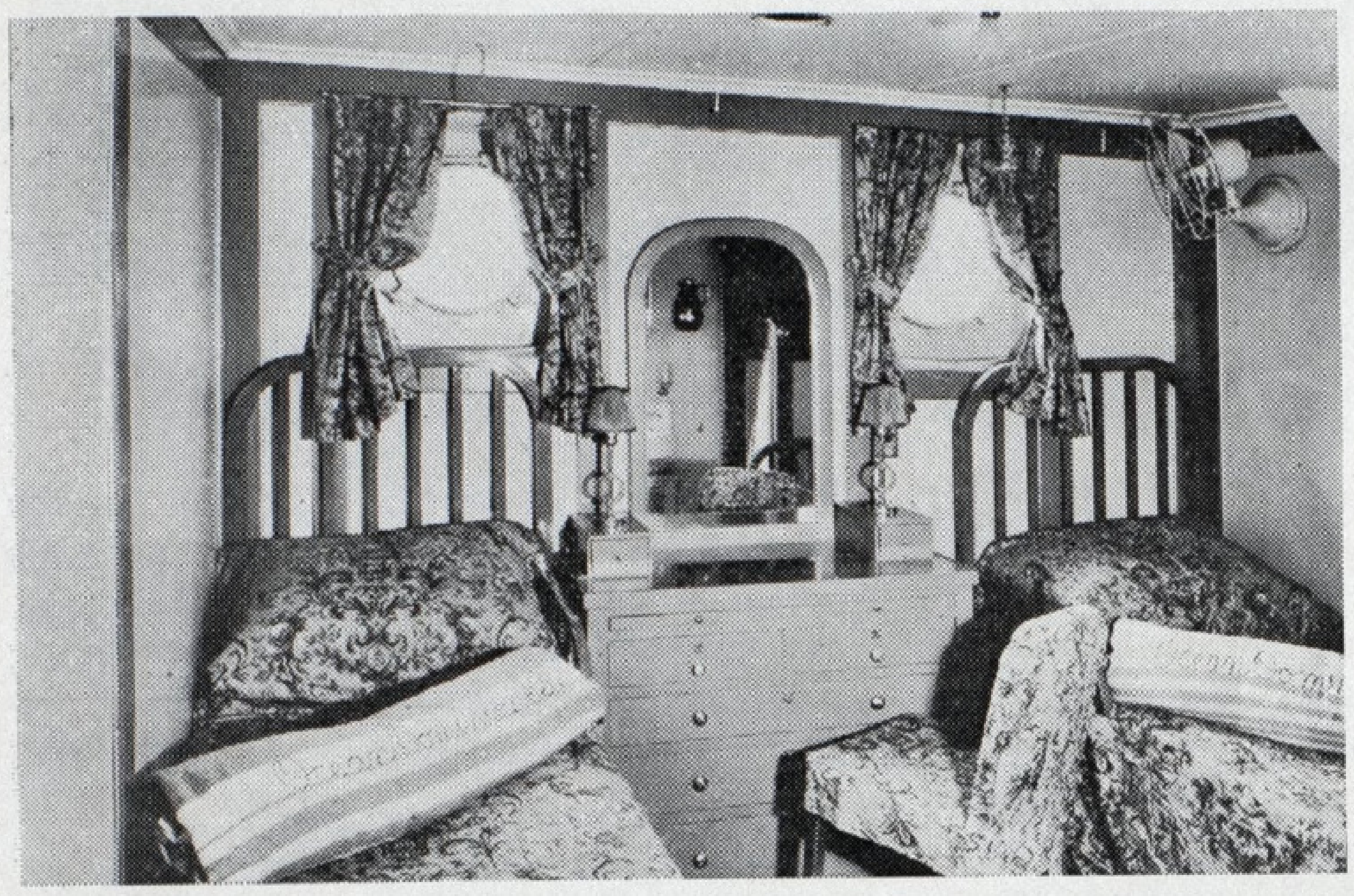
vices consist of fire extinguishers, firewagons which carry tanks of fire-extinguishing chemicals and of which there are several on each deck, water pumping systems, sprinkler systems, and smoke-detecting apparatus.

All of these devices, however, may be more or less ineffectual if the hazard of fire is not properly guarded against in construction. It is in the field of construction that the more important future advances will be made.

The heavy steel hulls of ships are well able to withstand extreme heat for long periods of time. Heavy steel is also used in the construction of the principal bulkheads, and partitions, so that a fire may be confined to a definite space. Perhaps the principal reason why metal has not been used in the construction of cabin partitions is the difficulty, because of the increased weight involved, in securing a safe margin of stability. Since the position of the center of gravity is one of the principal factors in stability, weight properly placed determines the vessels seaworthiness.

Private dining room on S. S. Haiti, protected from fire by aluminum partition bulkheads, aluminum furniture, metal airport frames and rugs and draperies sprayed with a fire retarding chemical solution





Cabin on board of one of the newer coastwise liners. The beds are of metal, so are the dresser and airport frames. The chair is of aluminum

Partitions on Normandie

Designers of the French superliner Normandie, now being built at St. Nazaire, to solve their problem, decided to use a new material for partition bulkhead construction. They took aluminum sheet and faced it with asbestos covered by a thin layer of veneer. This was treated with chemicals to render it fire-retardant. The lightness of the upper decks was thus not disturbed, yet the partitions were made much more fireproof than would have been possible with any other construction than metal.

Aluminum's relation to lightness, strength, and firesafeness was emphasized last year at Milan's Sample Fair, where a full-size model of a stateroom was exhibited. Walls and ceilings were made of a strong aluminum alloy called Peraluman. To this was glued an insulating sheet of fireproof Cel-Bes. Instead of paint, the exposed side was coated with linoleum, which, properly cemented to a base, behaves like an incombustible material.

A study of materials suitable to replace plywood was made in the United States last year, the most recent of which was under the direction of George G. Sharp, New York naval architect.

Fire Tests Conducted

Mr. Sharp is chairman of the conference committee on construction of the marine committee of the National Fire Protection association. Tests were conducted at Jamestown, N. Y., at Edgewater and Camden, N. J., to determine the best all-around material for cabin partition construction. In the most exhaustive of all tests beams of steel were erected in an open lot, and around these a 9x12 feet stateroom was constructed. The walls of this stateroom consisted of various types of panels, such as steel, aluminum (both insulated and hollow) phenolic composition, untreated veneer, asbestos mill board, untreated veneer with insulated bonding, hard asbestos veneer, and steel and aluminum doors.

The model stateroom was completely furnished to approximate the conditions of an actual stateroom in a fire. Furniture, sheets, draperies, rugs, luggage, clothes and a locker were distributed about the room. The roof and the floor were of quarter-inch steel plate. The contents of the room were sprinkled with kerosene at the beginning of the test, and kerosene-soaked fabric was spread from one piece of furniture to the other to insure rapid combustion. The combustible material was touched off with a lighted match and results were noted.

Resistance of Metal Panels

It was more than an hour before the fire burned itself out. Long before the expiration of the blaze many of the weaker panels had crumbled. The only ones which withstood the elevated temperatures, which reached, in some instances, as high as 1800 degrees Fahr., were the panels and doors constructed of steel and aluminum, although the melting point of aluminum is only 1260 degrees Fahr.

This paradox is explained by the fact that the aluminum panel was built in three sections. Two sections were flat sheet, the third corrugated sheet. The corrugated sheet section was secured between the other two sections. The temperature between the inside and the outside of the panels varied more than 500 degrees. Thus while the sheet nearest the flame melted away, the corrugated sheet, and the outer sheet, were cool enough to withstand the heat.

The other tests were similar to the one just mentioned with the exception that the size of the enclosures varied. They indicated in all cases that the use of metal for proper fire protection is obligatory, and, secondly, that a combination of steel and aluminum may be made advantageously to maintain the present seaworthiness of existing ships as far as satbility is concerned. The plywood partitions in use today weigh about 2.5 pounds to the square foot. Steel panels of the proper thickness weigh about twice as much, while hollow aluminum panels of the type described weigh only 1.6 pounds per square foot.

Solid Steel Panels Heavy

If steel panels of the proper thickness were used only, they would

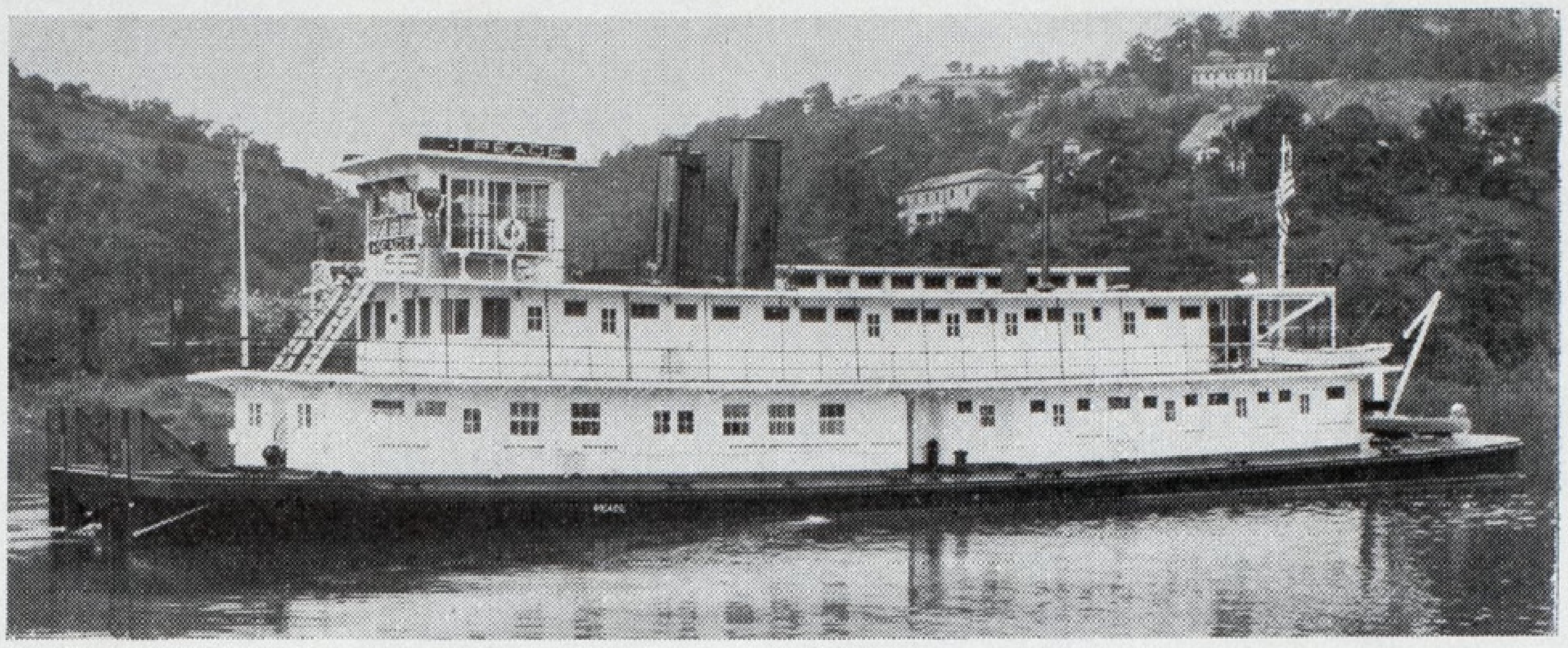
(*Continued on Page* 38)

PEACE,

A New River Towboat, Twin Screw, Diesel

CELEBRATING the Union Barge line's one hundred and fiftieth voyage between Pittsburgh and Memphis, Tenn., the new twin screw, diesel engined towboat PEACE, built by the Dravo Contracting Co., left her Pittsburgh dock, Oct. 25, with a nine-barge tow. The trip was broken by frequent stops at principal river cities and thence continued on to New Orleans. The 1952-mile voyage from Pittsburgh to the Gulf of Mexico finds this modern argosy arriving at New Orleans Nov. 18.

Among Pittsburgh shippers whose products were represented on the one exhibition barge of the tow were: Jones & Laughlin Steel Corp., Carnegie Steel Co., Spang, Chalfant & Co. Inc., American Steel & Wire Co., Wheeling Steel Corp., Koppers Products Co. and Dravo Contracting Co.



PEACE, river towboat, built by Dravo Contracting Co. for Union Barge Line Corp., left Pittsburgh Oct. 25 on maiden trip for New Orleans

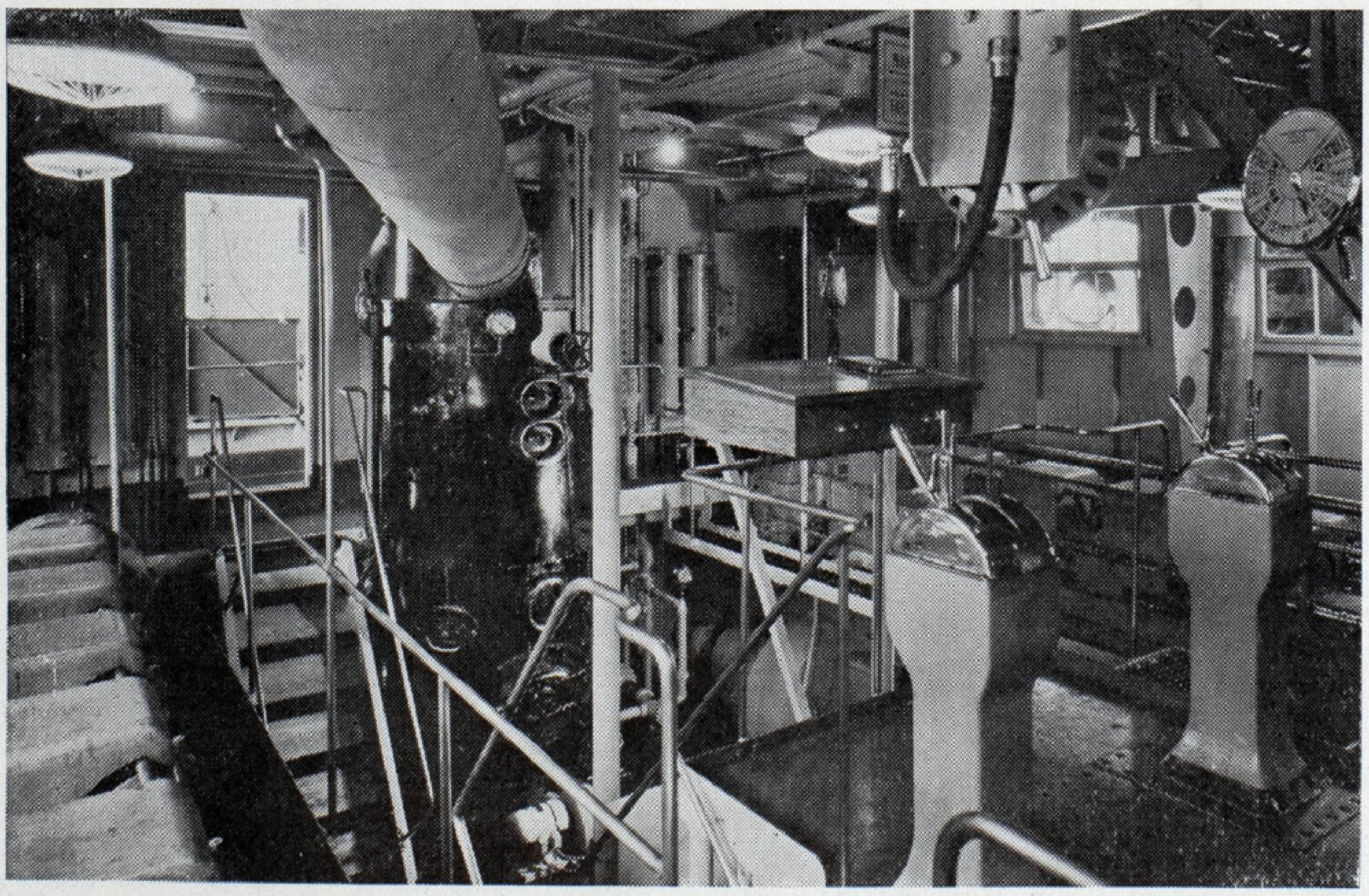
Newest Vessel of Fleet

The PEACE is the latest vessel to be added to the fleet of the Union Barge line which includes the river towboats SAM CRAIG, C. W. TALBOTT, J. D. AYRES, and RELIANCE; and a large and varied fleet of barges. This fleet has been a leader in the renaissance of river traffic during the last few years. The packet is no longer a factor and in its place great fleets of barges carrying vast tonnage are being used on regular and fast schedules by powerful and economical towboats.

Cheap, regular and reliable transportation of all classes of goods, from package freight to bulk gasoline, from steel bridge trusses to baled cotton, is now available to the river shipper. The PEACE is dedicated to the continuance and furtherance of this service.

Designed as well as constructed by the Dravo Contracting Co., the trial runs of the PEACE fully justified expectation as to her performance. Running free, without tow, she has logged 12 miles per hour and has pushed six empty standard 175-foot coal barges at 8 miles per hour. The addition of three similar barges to the fleet reduced the speed only two-thirds of a mile per hour. The engines at all speeds are quiet and remarkably free from vibration.

Launched on Aug. 14 last, the design of the PEACE realizes the economy of diesel power within the limitations of draft imposed in river operation by applying this power directly to twin propellers in partial tunnels under the stern. Direct drive is possible without sacrifice of maneuverability by the aid of multiple rudder steering gear combined with an especially developed hull form.



Engine room of towboat PEACE, looking aft. Two 375 horsepower Winton diesel engines, each direct connected to a propeller

All Steel, Ship Shape

The all-steel hull is ship-shape with model bow and easy sweeping stern lines providing full water flow to the propellers. The length overall is 161 feet; length between perpendiculars, 160 feet; beam, 34 feet; and depth, 7 feet, 9 inches. The normal operating draft is 5 feet, 6 inches with a corresponding displacement in fresh water of 560 tons. The gross tonnage is 635 and the net tonnage is 560.

The propellers are of manganese bronze, 5 feet, 5 inches in diameter and 4 feet, 8 inches in effective pitch. Each propeller is driven by one six-cylinder, 14 by 18 inches direct reversible, solid injection, Winton diesel engine, developing 375 horsepower at 250 revolutions per minute.

Auxilary power is furnished by two 3-cylinder 8 by 10 inches Winton diesel engines, each driving a 50-kilowatt electric generator. All auxiliaries such as lubricating and fuel oil pumps, air compressors, centrifuges, circulating pumps, sanitary and fresh water pumps, and capstans are electrically driven. Also all auxiliaries used in connection with the main propelling plant are arranged and connected in duplicate to avoid lay-up from any possible breakdown.

Quarters for officers and crew are provided on the main deck aft and on the upper deck. Deckhouses and pilot house are of steel with wall board linings and partitions. Particular attention has been paid to the comfort and convenience of the vessel's personnel. Quarters are

large, well lighted, well ventilated, and special care has been taken to insulate all living spaces both from interior heat and the heat of the southern sun.

Features of Construction

In shaping the hull a pronounced sheer (2 feet, 6 inches) has been given the forward end with which the after sheer has been balanced to produce a graceful, sweeping curve, which in turn is reproduced in the upper and hurricane decks. Every precaution has been taken in the construction of the hull to provide strength and safety. For example, the seams of the hull and bulkheads in all the oil tanks have been riveted as well as welded. An important detail of construction is the intake well or sea chest. The sea chests, of structural steel enclosures, extend up to the main deck where they are provided with a non-watertight flush cover. The opening into the river is protected by a large, coarse grating but the final straining of the intake water before passing in the injection line is through a perforated plate which is lowered into the sea chest opening from the main deck and held in place by parallel grooves.

Among the unique features of the design are the propeller struts, which are placed aft of the propeller. The propeller shafts extending through the propellers are supported in roller bearings which are protected from the water by packing. This is done to eliminate overhanging weights and to steady a long length of exposed propeller shaft. The arms of the struts are streamlined and placed at an angle to the centerline of the shaft.

Control of both engines is brought to a central point in the engine room, so arranged that the maneuvering of one engine can be done with one hand. Both engines can be maneuvered by the engineer without leaving his station. This system of engine control was designed in co-operation with the Winton engineers and was manufactured by the Winton Engine Corp.

The system of lubricating oil supply to main and auxiliary engines has been laid out in duplicate to provide a certain oil supply despite any possible breakdown of any essential parts. All lubricating oil is centrifuged as often as may be desired and its temperature is controlled by automatic by-passes operating in connection with the cooler.

The compressed air system is fully automatic, served by motor-driven air compressors controlled by a pressure control switch which gives constant pressure without manual attention.

Steam for heating and other purposes is provided by a vertical oil-fired boiler having a 40-horsepower rating. An automatic oil burner, controlled by the steam pressure, operates only when the pressure falls below 14 pounds per square inch. The burner is entirely automatic and does not need the attention of an engineer.

Powerful Steering Gear

The steering gear has been designed to provide adequate steering power necessary to maneuver large fleets of barges. There are six rudders in all. The two main rudders are aft of the propeller and are of balanced, streamline form. Auxilary rudders are located forward of the propeller, one on each side of each propeller. The rudder systems are operated independently by means of direct acting hydraulic engines. An electrically operated steering gear pump in the engine room supplies oil at the working pressure of the steering engine, and is automatic in its operation. The pilot can control the main and auxilary rudders separately or together as he may desire.

Many other points of design of the power plant indicate the care that has been taken with every detail. Fuel oil tanks are provided with pressure and vacuum valves to eliminate fumes. An air whistle pointing forward and an air whistle pointing aft are mounted together on the stack and operate simultaneously to insure that signals are heard in all directions. A Lux system of fire protection operating with carbon dioxide gas is installed in the engine room. Complete call-back mechanical telegraphs are provided for communication between the pilot house and the engine room. Electric tachometers are located in both the engine room and pilot house. In fact the engine room is as fully equipped as on a modern ocean going vessel.

Capstans, which at times become the principal maneuvering power of the vessel, have been built with great care to insure their ruggedness and continued operation. The forward capstans are driven by 15-horsepower, direct current, electric motors through a cut-tooth spur-gear and vertical worm gear speed reducer. The side capstans are similar except that they are driven by 10-horsepower motors. A single barrel hand capstan is located on the after deck to assist in warping when the vessel is laid up.

Modern Electric Installation

The electric installation has been made entirely in basket-weave ar-

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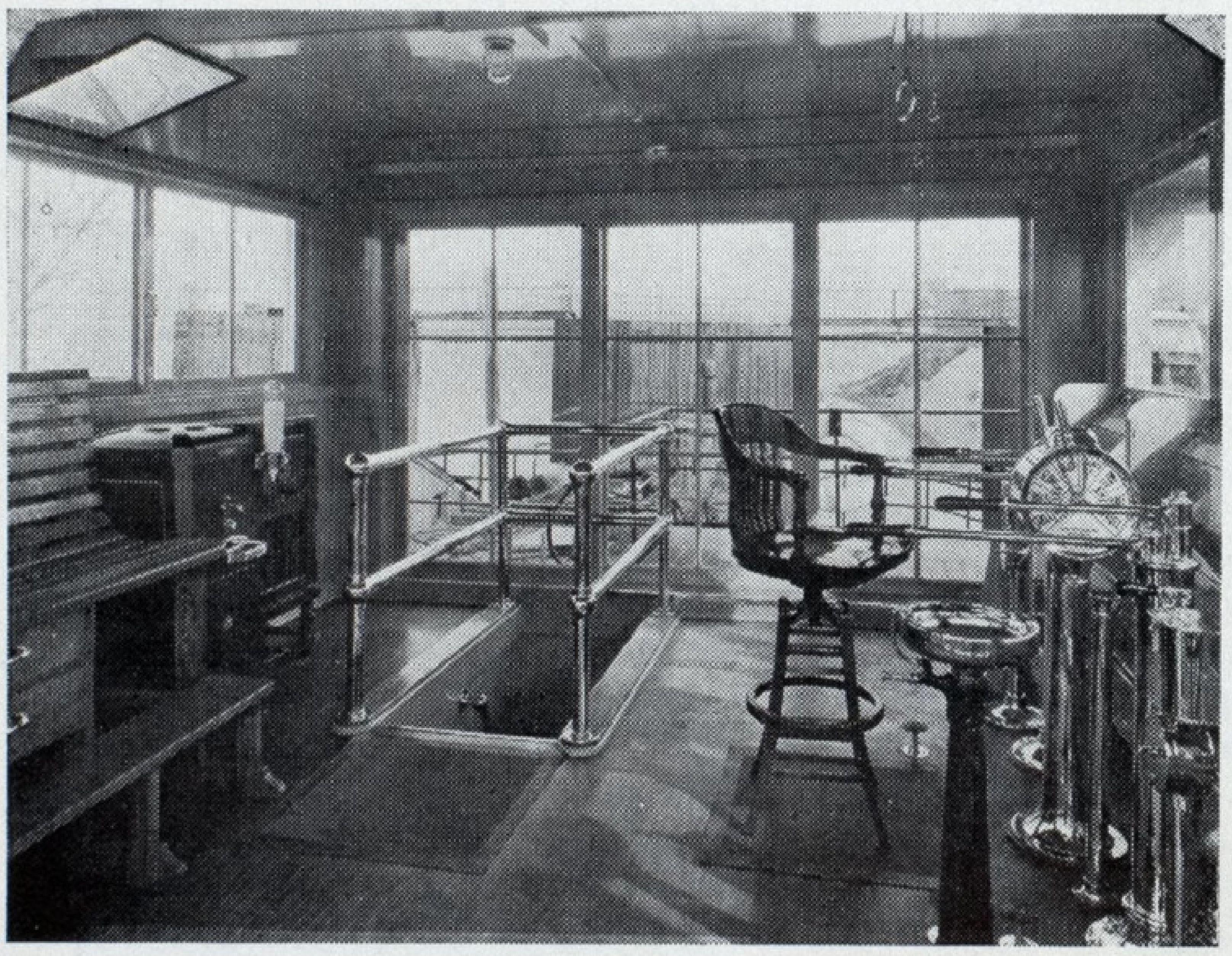
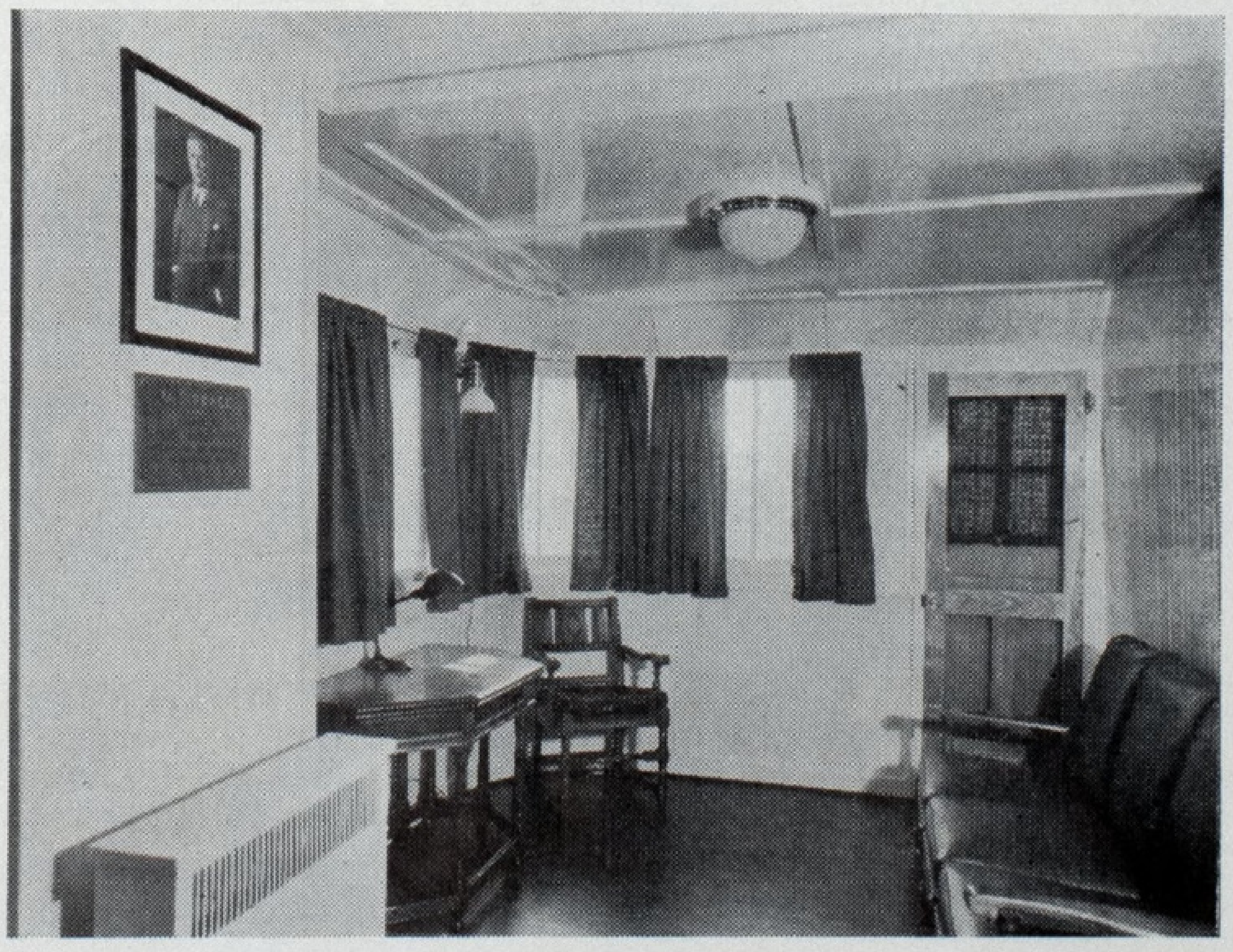


Pilot house of the towboat PEACE, *showing engine room telegraph and steering engine controls of lever type*



Officers' lounge on the towboat PEACE. *Quarters for officers and crew are large, well ventilated and lighted and insulated from both interior and exterior heat*

PROPELLER THRUST

Carried by Tapered Roller Bearings

BY J. BORLAND*

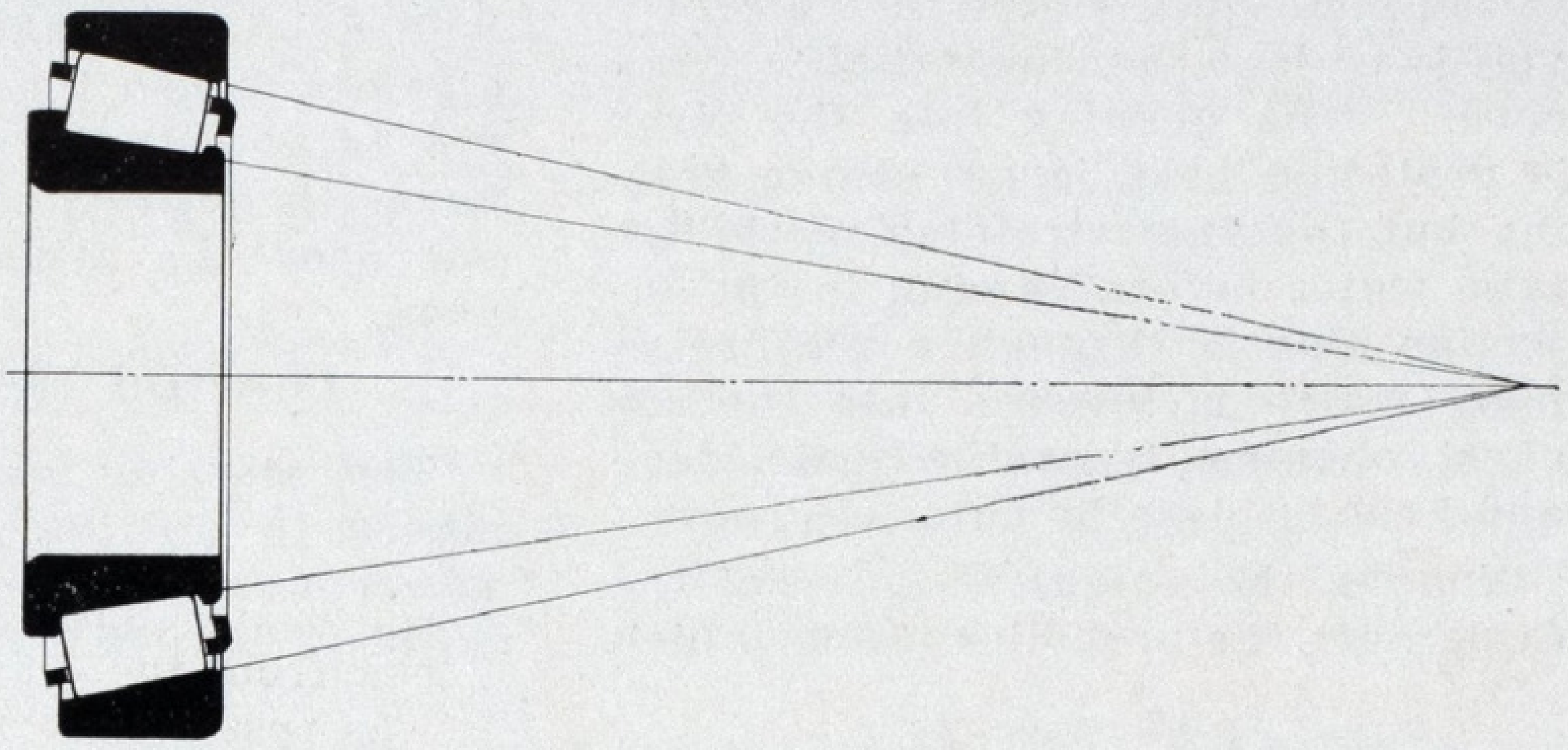
USE of tapered roller bearings to carry the load set up by propeller thrust is attracting the attention of naval architects and marine engineers. Most recent installations are those on the United States coast guard harbor cutters CALUMET, NAVESINK, TUCKAHOE, and HUDSON, the first three recently completed or under construction at the Charleston, S. C., navy yard and the last at the Portsmouth, N. H., navy yard. Only last year a tapered roller bearing thrust block was installed on the 10,000-ton United States navy cruiser CONCORD. Although the CONCORD installation is the largest made to date, tapered roller bearings have been successfully used for a number of years to carry the propeller thrust in smaller craft. The increasing use of this type of bearing is due to its ability to carry the load with a minimum of friction and wear, and to the fact that when wear does occur, adjustment is easy.

Radial and Thrust Loads

The tapered roller bearing consists of a cone, or inner race, a cup or outer race, and a number of tapered rollers which are spaced around the cone by means of a cage. Lines drawn coincident with the working surfaces of the bearing meet at a common point on the axis of the bearing, as shown in Fig. 1. It is apparent that true rolling motion takes place in the bearing and that it is capable of carrying both radial and thrust loads, or any combination of the two. It is also evident that if any wear occurs on the working surfaces of the bearing, the taper permits of its being readjusted to the original setup.

In a properly mounted and lubricated tapered roller bearing the coefficient of friction compares favorably with that of the latest type of plain thrust bearing and is several times less than that of the horseshoe collar type of bearing once popular for marine work. Definite test data regarding the coefficient of friction of a tapered roller bearing in marine thrust service is not available. However, in other applications under continuously applied heavy radial loads, the coefficient has been found to be approximately 0.002. For a pure thrust application a coefficient of 0.003 can be anticipated. The friction in the bearing being very low, very little power is lost in it and the majority of the heat dissipated will be due to the friction caused by churning of the lubricant.

Fig. 1 — Principle of tapered roller bearing for carrying simultaneously both radial and thrust load



*The author, J. Borland, is a member of the staff of the Engineering Department, the Timken Roller Bearing Co., Canton, O.

The installation of tapered roller bearings mentioned above on the coast guard vessels is shown in Fig. 2. It will be noted that the bearing has a double cone having a tapered bore. The cone is also designed with a groove for a puller, which, in connection with the tapered bore, permits easy removal of the bearing from the shaft. The shaft itself is designed to be used as a section of the propeller shaft and is fitted with flanges for couplings. The bearing housing is made self aligning so that any deflections in the hull will not put undue loading on the bearing. The bearing itself is 6⅞ inch bore at the large end of the taper by 14¾ inch outside diameter. It is 9 5/16 inches wide over the cone and 5 15/16 inches wide over the cups.

Spacer for Adjustment

Adjustment of the bearing is obtained by grinding the spacer between the cups to size. Lubrication of the bearing is effected by the maintenance of a level of oil in the box, the oil being prevented from leaking by the closures shown. This unit is designed to transmit 800 brake horsepower at a speed of 300 revolutions per minute. The calculated thrust load at 12 knots is 14,500 pounds.

This application shows clearly the advantage of the tapered roller bearing in carrying both radial and thrust loads. The bearing not only takes care of the thrust from the propeller, but also acts as a supporting bearing for the propeller shaft. This feature permits of shorter units, it being unnecessary to provide radial bearings to support the shaft in addition to the thrust bearing.

A tapered roller bearing thrust block was applied to one of the shafts of the 10,000-ton cruiser CONCORD in

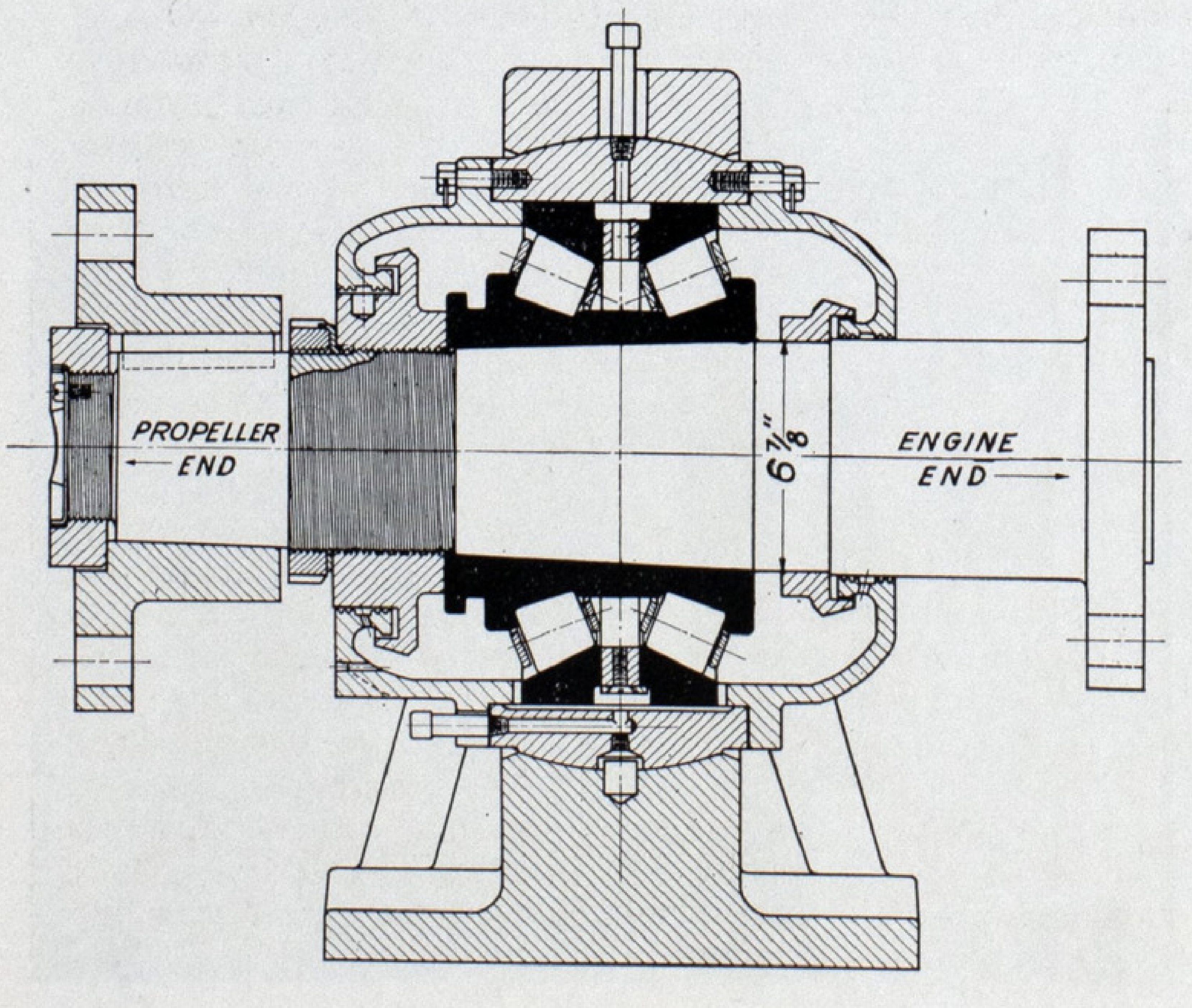


Fig. 2—Tapered roller bearing thrust block for the new Coast Guard harbor cutters. Carries propeller thrust load and also serves as a supporting bearing for propeller shaft

the early part of 1933. Since that time the bearing has been frequently inspected and has given a very satisfactory account of itself. The CONCORD participated in the movement of the fleet from the Pacific to the Atlantic and at the present time is again based on the West coast.

The CONCORD has four screws and develops a total of 95,600 brake horsepower at a shaft speed of 358 revolutions per minute. The calculated thrust load on each shaft at a speed of 33.5 knots is 155,000 pounds. Each of the four shafts is driven through a reduction gear and as originally constructed ,each shaft was fitted with a segmental shoe type thrust bearing at its forward end.

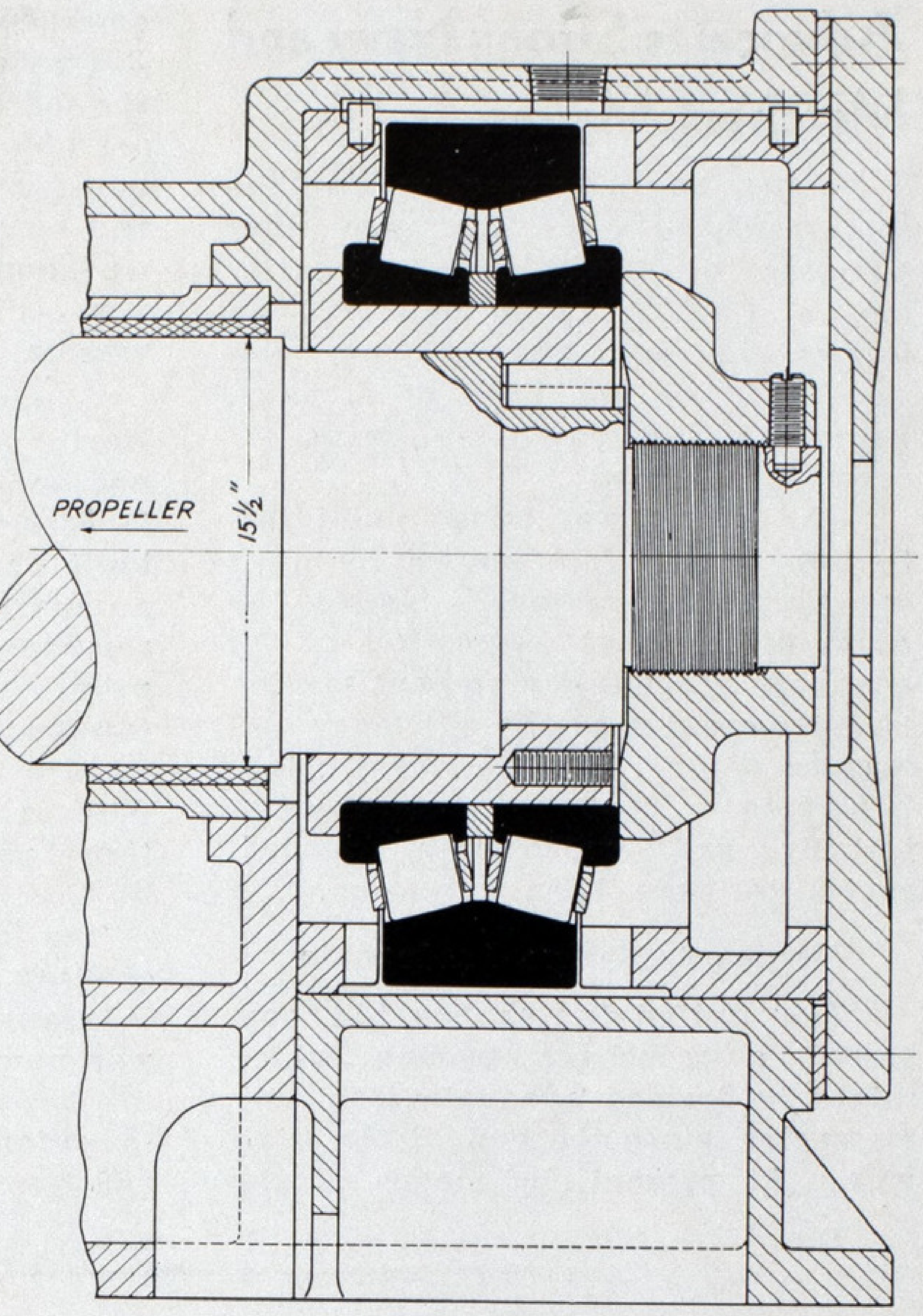


Fig. 3—Tapered roller bearing thrust block unit as installed on one of the four propeller shafts on U. S. S. Concord. The bearing consists of a double cup and two single cones. Adjustment is made by means of the ground spacer between the cones. The bearing cones are mounted on a sleeve which is pressed on to the forward end of the propeller shaft

Cones Mounted on Sleeve

Application of the tapered roller bearing to replace one of the original thrust bearings is shown in Fig. 3. It will be noted that the bearing consists of a double cup and two single cones, adjustment being made by the ground spacer between the cones. It is 18 inches bore, 31¼ inches outside diamter by 10 inches wide over the cones. The bearing cones are mounted on a sleeve which is pressed on to the forward end of the propeller shaft.

Inasmuch as this application was designed to replace a pure thrust bearing, it was not desired that the tapered roller bearing carry any radial load. Therefore, the double cup of the bearing is free to float radially in the housing with about 0.015 inch axial clearance between the cup and the spacers. The plain bearing, a portion of which is shown at the left-hand side of the cup, is the forward bearing of the propeller shaft carrying part of the load from the driving gear.

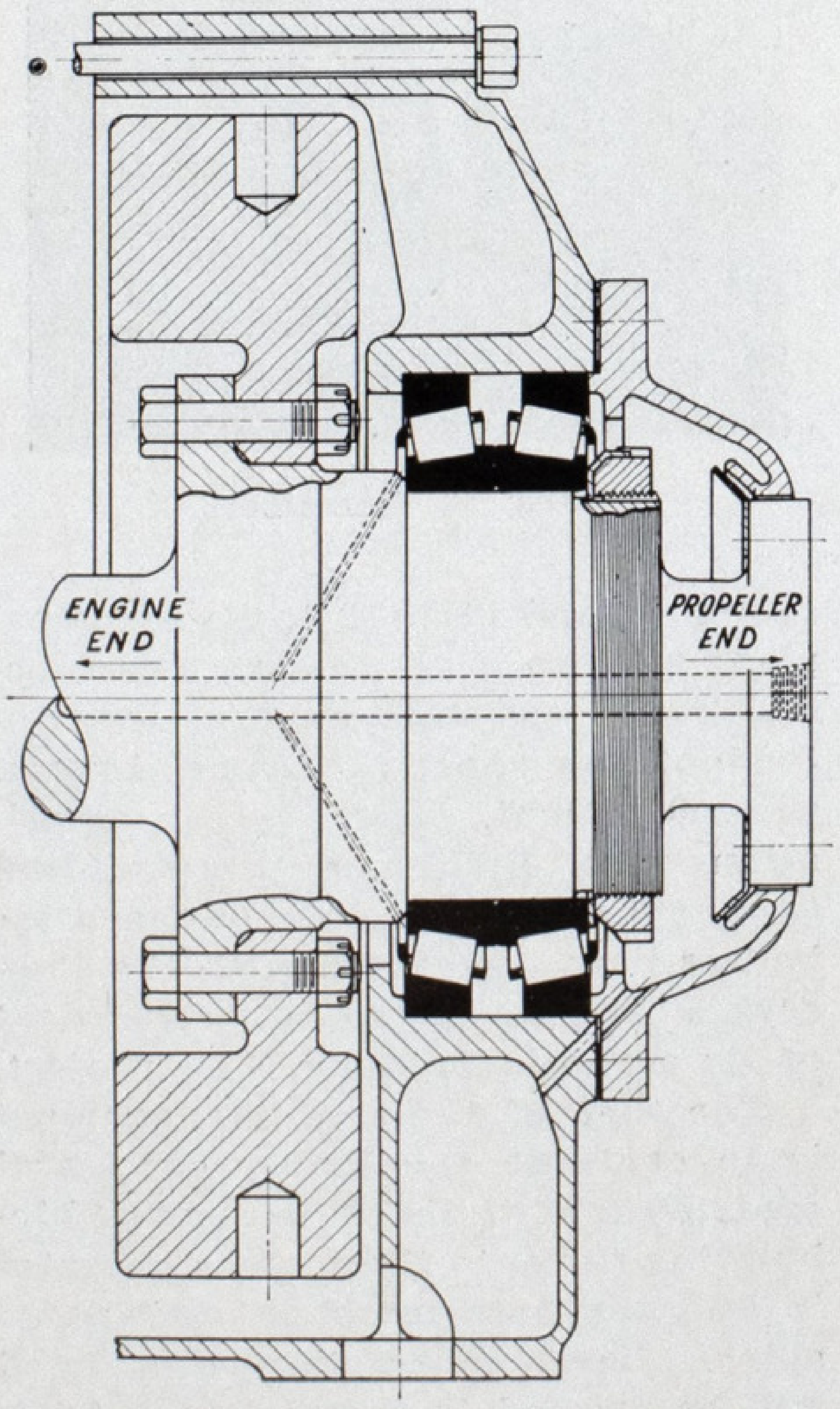


Fig. 4—Standard design for roller bearing thrust unit at aft end of engine crank shaft

It was possible to make this test installation of a tapered roller bearing without making any changes whatsoever in the shaft or bearing housing. If it had not been required that no changes be made in the shaft or bearing housing, it would have been possible to have used a considerably smaller tapered roller bearing than the one actually used and still have had a sufficiently large bearing to adequately handle the loads.

The bearing is lubricated by means of the same circulating system that is used for the plain thrust bearings on the other three shafts. Oil is introduced at the bottom of the box and forced out at the top, the entire box being flooded at all times.

A third type of mounting that has been used considerably in the past is shown in Fig. 4. Here the bearings are mounted at the aft end of the engine crankshaft and the shaft is directly coupled to the propeller shaft. Two single row bearings mounted back to back or a double cone bearing are used, the cones being clamped against a shoulder by means of the nut. The bearing adjustment is made with the thin metal shims shown between the bearing housing and the closure flange. The bearing is lubricated with the same oil that is in the crank case of the engine, an adequate closure being provided to prevent leakage.

This type of mounting was used on several 150 brake horsepower at 400 revolutions per minute diesel engines which were built for the United States navy in 1932 and which are at present in service on the West coast. The bearings used were 10 inches bore by 15¾ inches outside diameter. It is also used on the two eight-cylinder 9 x 12-inch diesel engines on the yacht NEHEMOOSHA owned by Alfred Du Pont with 5¾ inches bore by 12 inches outside diameter bearings. Some 40 or 50 other vessels of comparable size have also been equipped with tapered roller bearings mounted in this manner to carry the propeller thrust.

Should Lubrication Fail

Possibly the outstanding feature of the tapered roller thrust bearing for marine service is the fact that a failure of the lubricant supply does not mean an immediate failure of the bearing. In any type of bearing in which contact between the rubbing surfaces is prevented by an oil film, failure of the oil film would probably cause almost immediate seizure. While it is not recommended that any type of anti-friction bearing be run without lubrication, a failure of the lubricant supply would not be disastrous. Timken bearings would undoubtedly continue to operate for some time without oil before complete failure occurred and in the meantime, would give warning of their condition by heating.

Another advantage is gained by the fact that tapered roller bearings are always mounted in pairs. Obviously, when the vessel is traveling only one row of the bearing is under load. In the unlikely event of a complete failure, it would be possible to make an emergency repair by disassembling the unit and reversing the bearings, thereby bringing the other set of rolls into action.

Advocates Strong Navy and Merchant Marine

On Oct. 26, in connection with the celebration of navy day and under auspices of the National Security league, Carl J. Lamb delivered an interesting radio address from station WOR on the need of a navy. From this address the following excerpts are quoted:

"The World war called public attention to the fact known by navy men, but not previously realized by most of us, that possession of an adequate peacetime merchant marine is indispensable to the efficiency and success of our wartime naval establishments. That lesson although bitterly and expensively learned, seems to have been forgotten.

Merchant Marine Inadequate

"The United States has not possessed a merchant marine which might be termed adequate from any viewpoint, since the end of the Civil war. At present, by means of the emergency war-built vessels and the 32 modern ships built as a result of the merchant marine act of 1928, we are able to carry only 33 per cent of our foreign trade whereas any fair and sensible person will realize that we should carry a minimum of 50 per cent of our trade in our own vessels.

"Approximately 80 per cent of the North Atlantic passenger traffic is not only of American origin, but it is carried mostly in foreign vessels built under subsidies as naval auxiliaries, and manned by naval reserve personnel. In a very definite way, when we thus favor foreign cargo and passenger ships, we are contributing to the national defense and trade supremacy of those nations whose flags are flown by the vessels thus patronized.

"As long as we elect to retain the existing foreign policies and continue to trade abroad, we dare not risk war now or in the future, by failing to provide that seapower needed to enforce them and to protect us and our descendants."

Experienced Firemen Used on United Fruit Line

According to a recent statement, made by Commissioner J. J. McElligott, of the New York fire department, a new field has been opened up to retired firemen. Commissioner McElligott's statement is quoted in part as follows:

"United Fruit Co. has come to me with the request that I send them expert firemen now on our retired list after twenty years of faithful and efficient service. These men have been supplied for the cruise liners of the United Fruit Co. great white fleet, and two have been assigned to each of their vessels in the New York service."

These former firemen become chief petty officers. They have separate and special accommodations on the ships and wear uniforms clearly denoting their function. They report directly to the captain of the ship. Their duties are to patrol the ship from 4 p.m. to 8 a.m. every day, both at sea and in port, their watches being divided into four-hour shifts.

Personnel Appointments at N. Y. Shipbuilding Corp.

Brief reference was made in the November issue of MARINE REVIEW to changes in the personnel of the New York Shipbuilding Corp., Camden, N. J., which took place on Oct. 19. C. M. Kaltwasser was elected executive vice president and member of the executive committee and Roy S. Campbell was appointed the new general manager. For several months past Mr. Kaltwasser had held the position of assistant to the president.

He graduated in mechanical engineering at Stevens Institute of Technology, Hoboken, N. J., in 1905.

C. M. Kaltwasser

Starting his career in the power house of a public utility, he came into the management of electric lighting, power and street railway properties.

Subsequently, Mr. Kaltwasser became vice president and general manager of the Salisbury Axle Co., Jamestown, N. Y., and later vice president and general manager of the Brown-Lipe Gear Co., Syracuse, N. Y.

In 1928 he became vice president of the Timken-Detroit Axle Co., Detroit, Mich., after which he became associated with the Cord Corp. Mr. Kaltwasser keenly appreciates the wide scope of shipbuilding, which includes so many crafts, such large volumes of material, such exceptionally skilled requirements, and the enormous tonnages of materials accurately to be fabricated.

Roy S. Campbell

The new general manager, graduated in naval architecture and marine engineering at the University of Michigan in 1912.

Since then, from mold loft apprentice to master mechanic, to superintendent, and to general manager, all of his experience except for the last two years has been in shipbuilding, both hull and machinery. From 1912 until 1917 he was with Newport News Shipbuilding & Dry Dock Co. Leaving there as master mechanic, he became superintendent of machinery at the Harlan plant of the Bethlehem Shipbuliding Corp., Wilmington, Del.

In 1919 he was transferred to the Sparrows Point plant of the same

Roy S. Campbell

company, and in 1922 to its principal plant at Fore River, Mass., where beginning as assistant general superintendent, he shortly became general superintendent. His 15-year association with Bethlehem Shipbuilding Corp. ended in 1932. Since that time he has been associated with the Babcock & Wilcox Co. as superintendent of its gigantic Boulder Dam project.

The aim of the new management is to continue the highly successful contribution of the New York Shipbuilding Corp. to the marine industry in building both merchant and naval ships. Large contracts now on hand will be pressed to completion. Additional labor will be employed as rapidly as required.

An Operator's Comment on Radio Communications

By George J. Frank*

I READ with interest the article by Capt. S. C. Hooper on communications in the September issue of MARINE REVIEW. I do not question the authenticity of Captain Hooper's statements regarding radio communication problems in general, but I do disagree with him regarding their application to merchant marine officers.

I take particular exception to his statements, "it must be noted that radio operators on board ship are not expert radio engineers, neither do many of them realize the complexity of the world's communication set-up, its disputes or problems. As radio operators, they perform their work satisfactorily, but they cannot be considered as communications officers, since the latter must have a good general background of technical development, world-wide operational co-ordination, and the knowledge required to advise the master correctly and intelligently. No responsible master would desire any other advice."

It is my contention that radio operators are thoroughly qualified to fulfill these requirements.

Must Pass Rigid Examination

Although radio operators cannot be classified as, "expert radio engineers," they must pass a rigid technical examination and have a thorough knowledge of all problems connected with radio communication in order to obtain a government license. These requirements ensure sufficient knowledge to enable them to make repairs in case of failures of equipment, and further qualify them for the requirements, so adroitly expressed by Captain Hooper as, "operational features of radio communication in order to exercise intelligent supervision." It follows that with this training they are capable of co-operating with and advising the master on all matters pertaining to radio communications.

Captain Hooper infers that considerable delay in coming to the rescue of the VESTRIS was due to interference by, "irresponsible radio operators", who interfered with distress communications. It must be borne in mind that prior to a distress signal, the air is usually congested with stations carrying on radio traffic, and a reasonable period must elapse before these stations can be silenced. The responsibility of quieting the air lies with the nearest commercial station, coastal navy station, or naval vessel to the ship in distress.

It is obvious that some confusion will exist before this is accomplshed. If two automobiles were to collide in a crowded thoroughfare, it is only natural that much confusion and delay would ensue before traffic officers could clear the jam. This is analogous to what occurs when a distress signal is first picked up. Operators who persist in creating unnecessary interference, after a distress call is sent, are subject to a fine and imprisonment as set forth by the rules and regulations of the federal radio commission, and should be logged and reported by stations in control of the situation.

Even if, as Captain Hooper comments, "A good knowledge of national and international radio regulations is necessary in such cases. Had the officers on many of the interfering ships exercised the proper supervision . . . it is probable that much valuable time would have been saved.", it would not have altered circumstances, as the radio operators are directly in control of communication operations.

Under War Conditions

The suggestions by Captain Hooper, as to the use of radio during war times, are absurd and an unjust reflection on the dependability of the radio operators in an emergency, who have always handled themselves in a commendable manner, as past records testify. He states, "War warnings can be sent to the ship via commercial radio stations, naval stations, cable, or consular officials . . . With a good general knowledge of communications, his task (master's) is made easier — his knowledge prevents him from placing himself in a helpless position with regard to advice from his radio operators."

Who, more so than the operator, would have a better knowledge of the proper routing of communications under the above conditions, whose duties require that he be familiar with various radio stations or communication channels in order to clear his traffic? Not only does he become familiar with these channels through their constant use, but he also acquires from experience a practical knowledge of their range when employing different types of transmitters, seasonal and atmospheric effects, or other phenomena of radio communications that is important in establishing contacts. The captain, regardless of his communication knowledge, could not alter the conditions just stated and would have to rely on his radio operator's advice as to the best channel.

Since the adoption of short-wave transmission (high frequencies) aboard merchant ships, with its advantages of almost unlimited range and freedom from atmospheric conditions, such as encountered on the low frequencies, direct contact with the United States can be accomplished from almost any part of the world. Although most foreign ships on long runs are equipped with short-wave transmitting apparatus, comparatively few American ships on similar runs are so equipped, even though for years radio operators have pointed out and explained their advantages to masters and owners.

Officers Not Experts

Just as most radio operators are not expert radio engineers, most engineers on merchant ships cannot be considered as master engineers or mechanics. In fact, I have often heard them caustically referred to as "throttle pullers". They have been known to have had breakdowns, and at times have been brought in on the end of a tow line; nevertheless, this is an exception, and they do manage somehow to keep their ships running, even if not engineering wizards.

Now, I would go Captain Hooper one better and suggest that our merchant marine officers acquire a thorough knowledge of marine engineering. In an emergency (when engineers gave him full speed ahead, when he rang for full speed astern), our dashing captain could do some dashing back to the engine room and take full charge. Or he could send his super-trained communication-navigating-engineering officer to assume command. And why stop here? Perhaps Captain Hooper would further recommend that captains should acquire still more specialized training, so that when the skipper piles the good ship "Journey's End" upon the rocks, he could — for the enlightenment of posterity — carve his name on the rock upon which he is so gracefully reclining, with such vindicatory titles as B. Sc., M. S., D. Eng. What an impression that would make on the steamboat inspectors!

A few American and foreign shipowners employ mate-operators as combination officers — and it is a notable fact that this practice is being gradually discontinued, however, due to the inefficiency of this type of service. Shipowners have found that it is more economical and that they receive better service by using experienced operators to handle their radio communications.

*The author, George J. Frank, is radio operator on the Motorship BIDWELL.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

THE libel in the case of McAllister No. 55, reported in 7 Fed. Supp. 470, was filed to recover damages resulting from the parting of a sling which was engaged in removing a condenser from the engine room of a steamship to the deck of a derrick lighter. The condenser, in falling, struck the side of the steamship, damaging that vessel, and then fell on a new condenser as well as the deck of the lighter. The condenser being lifted weighed approximately 15½ tons and had to be lifted through a hatch 45 feet above the surface of the water. The sling, 34 feet long, was of 1⅛-inch steel wire, and it was contended that it was not strong enough for the work in hand. The court held against this contention, it being shown that the condenser did not, at any time, strike anything while being raised out of the steamship, and did not strike anything after being raised out and before it fell, but that the accident was caused by the sudden stopping of the descent of the condenser, which caused it to jerk and doubled the strain on the sling, which made the strain much greater than the safety point. The breaking strain of a 1⅛-inch sling is rated at 56 tons. The safety factor of 5 is commonly used, said the court, this showing the safe working load for the sling to be 11 1/5 tons.

* * *

TWO vessels approaching each other from opposite directions on North river, practically end on, must, under inland rules, make port to port passage, and it is the duty of the vessel giving a whistle signal of desire to pass starboard to starboard to pass port to port until the signal is answered by the other vessel. In the case of Southern Pacific Co. v. United States, 7 Fed. Supp. 473, it was declared that the vessel giving the whistle signal should consider whether she has the ability to do her part in carrying out the maneuver, and where her clumsiness is known to her officers but not known to the other vessel, the latter cannot be held in fault in assenting to the signal and attempting to carry out the proposal. On the assent to the whistle signal, it was the duty of both vessels to cooperate in carrying out the proposed passage; nevertheless, the signalling vessel was bound to keep out of the way of the other vessel.

* * *

WHERE a barge, which was moved in a slip to afford an outlet for drift which had accumulated behind her, was moored with hemp lines and broke away when the gorge which had lodged against the upstream end of the barge broke and struck her, causing her to drift into other moored vessels, the owner was negligent in not preventing the accumulation of drift and not anticipating the breaking of the gorge, and was liable for the damages resulting from the collision with other vessels, there being no proof that the breaking away of the barge was the result of inevitable accident or was an uncontrollable event.—Vang v. Jones & Laughlin Steel Corp., 7 Fed. Supp. 475.

* * *

QUOTING from the decision in the case of PAJALA, 7 Fed. Supp. 618: "He who is the owner for the time being may impose a lien on the vessel. He who is merely operating under a contract which in plain terms imposes on him the duty of furnishing fuel for the ship, does not stand in the place of the owner, even temporarily, and the supplier is required * * * to exercise reasonable diligence to inform himself of the difference." Specifically, it was held in this case that where fuel oil furnished to a vessel was not supplied upon the order of the master or anyone acting for him or for the owner, but under a general supply contract with the charterer, and the time charter, upon inspection which could have been made upon request, would have shown that the obligation to procure oil was on the charterer, not on the owner, the supplier was not entitled to a lien.

* * *

WHERE a vessel failed to discharge cargo at its destination, and, in shipping it back from another port, it was lost, the cargo owner was entitled to recover from the shipowner for the loss notwithstanding a provision in the bill of lading that the shipowner should not be liable for claims unless written notice thereof should be given to the shipowner before removal of goods and that, if goods should not be found during the usual stay of the vessel at the port of destination or transshipment, they should be sent back at the shipowner's expense but at risk of goods.—General Electric Co. v. Argonaut Steamship line, 7 Fed. Supp. 710.

* * *

WHERE a notice posted on the cabin of a vessel stated that under the terms of the charter party neither the charterer nor the master had the right to incur a lien upon the vessel, and a copy of the charter party was carried on the vessel for exhibition of any person having business with it, a person furnishing materials used on the vessel without inquiring as to the authority of the person ordering materials had no lien upon the vessel for the materials furnished. A maritime lien, being secret and unrecorded, cannot be conferred on the theory of unjust enrichment or subrogation, and the right of such lien cannot be extended by judicial constructive analogy or reference.—ALJOHN, 7 Fed. Supp. 788.

* * *

IF THE navigator of a vessel has any doubt as to the course of another vessel, there must be an exchange of signals before proceeding ahead on a new course. Where a vessel is approaching another vessel which has disregarded her signals or whose position or movements are uncertain, she is bound to stop until her course be ascertained for a certainty. —RADIUM, 7 Fed. Supp. 804.

* * *

ABSENCE of the captain from a schooner cannot prevent limitation of liability on the part of the schooner, notwithstanding the fact that had he been on board it is not likely that the accident would have occurred. Even though the absence of the master, pilot, or some other competent person constituted negligence on the part of the schooner, the absence of the master and pilot cannot be charged to the privity and knowledge of the owner.—T. K. Bentley, 7 Fed. Supp. 565.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	290	1,555,651	284	1,539,537
September	271	1,645,919	284	1,624,272
August	296	1,815,221	332	1,859,966
July	313	1,686,825	295	1,574,395
June	239	1,696,804	324	1,785,815
May	291	1,597,233	316	1,662,711
April	288	1,599,185	274	1,477,492
March	302	1,706,307	313	1,757,221
February	265	1,481,004	267	1,508,905
January, 1934	266	1,649,590	284	1,629,438

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	55	143,330	56	146,265
September	52	143,092	44	115,845
August	56	151,501	41	120,875
July	48	125,616	35	89,902
June	61	191,042	53	155,308
May	58	169,719	50	143,652
April	67	199,032	48	147,083
March	59	162,480	48	140,311
February	42	129,940	36	109,973
January, 1934	45	139,259	47	133,427

Boston

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	93	339,602	63	234,302
September	110	362,773	75	238,557
August	129	377,219	106	363,789
July	136	374,494	112	392,586
June	125	337,627	105	316,594
May	105	301,785	82	245,571
April	86	309,725	58	227,404
March	88	304,604	64	259,406
February	71	247,077	46	162,542
January	97	330,320	60	225,075
December, 1933	84	303,806	52	236,871

Portland, Me.

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	19	34,735	17	28,611
September	16	35,064	15	34,285
August	23	31,559	21	31,672
July	14	27,034	12	26,525
June	15	30,296	16	43,232
May	15	27,376	15	32,378
April	14	20,555	15	20,572
March	13	33,399	13	33,399
February	11	27,213	11	27,213
January, 1934	9	22,908	10	25,570

Providence

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	3	11,084	1	1,901
September	4	13,022	2	8,628
August	7	12,240	5	11,809
July	4	11,634	4	17,821
June	8	14,773	4	4,887
May	3	4,985	1	2,022
April	3	4,985	1	2,022
March	5	17,973	2	7,422
February	7	20,959	2	6,882
January, 1934	2	7,694	....	....

Portland, Oreg.

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	......	....	......	....
September	......	....	......	....
August	30	119,182	49	194,079
July	12	46,946	11	39,730
June	10	34,726	1	2,298
May	11	41,765	17	58,993
April	31	117,094	42	157,954
March	32	121,085	50	186,817
February	25	95,774	52	198,593
January	32	116,610	50	188,401
December, 1933	31	119,833	51	184,646

Baltimore

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	96	282,930	100	308,916
September	91	276,111	93	284,297
August	92	278,812	96	280,641
July	108	319,702	106	317,583
June	108	339,280	112	356,445
May	104	329,312	107	328,998
April	102	300,396	108	334,583
March	92	288,061	88	273,131
February	77	261,122	77	263,236
January	78	256,942	80	265,681
December, 1933	94	298,001	92	286,746

Norfolk and Newport News

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	28	83,089	41	102,699
September	26	67,068	44	107,698
August	21	111,553	37	113,616
July	25	76,320	33	91,111
June	39	91,293	57	127,068
May	31	71,706	50	103,737
April	21	65,701	47	125,291
March	23	64,469	60	151,360
February	16	47,708	41	102,933
January, 1934	22	68,930	41	112,922

Jacksonville

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	13	22,913	17	32,357
September	18	21,329	18	24,657
August	20	25,558	21	37,676
July	18	16,470	16	18,145
June	16	21,226	18	30,898
May	14	13,340	22	38,824
April	10	10,464	7	12,164
March	9	16,338	9	11,193
February	8	10,900	11	20,348
January, 1934	7	13,017	10	22,508

Key West

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	26	26,491	25	26,899
September	21	23,268	21	23,282
August	23	24,392	24	24,706
July	25	24,469	25	25,564
June	28	33,701	25	32,548
May	40	57,180	42	58,094
April	28	36,197	21	36,066
March	24	38,052	23	37,658
February	23	36,476	24	36,523
January, 1934	25	39,966	22	38,764

Mobile

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	109	278,352	107	266,966
September	102	228,304	115	260,544
August	108	256,663	101	237,852
July	102	221,011	99	225,308
June	119	254,040	115	237,054
May	115	255,503	114	253,294
April	113	254,839	103	239,371
March	115	275,629	129	309,123
February	115	268,707	112	251,232
January, 1934	118	282,972	125	298,570

Seattle

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	54	230,438	55	222,014
September	45	184,361	43	221,241
August	43	176,644	54	223,038
July	24	93,558	20	82,646
June	16	73,128	12	52,309
May	22	103,441	19	86,295
April	62	264,608	67	278,172
March	52	203,796	51	205,371
February	54	226,118	62	251,281
January, 1934	52	221,000	55	230,995

New Orleans

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	175	499,832	177	492,802
September	159	453,453	157	426,341
August	145	385,557	154	403,163
July	156	439,297	154	423,642
June	141	300,349	151	416,734
May	167	482,123	152	421,839
April	169	487,655	170	475,121
March	155	422,855	166	449,394
February	151	446,952	145	414,515
January	146	423,759	145	414,918
December, 1933	139	398,112	152	443,496

Charleston

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	47	165,814	37	105,739
September	35	102,325	28	80,390
August	32	97,695	36	97,663
July	41	99,233	34	81,362
June	36	95,072	31	81,094
May	36	98,475	23	69,764
April	38	101,315	34	96,705
March	44	131,839	37	109,492
February	40	112,884	39	109,597
January, 1934	23	60,138	25	66,827

Galveston

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	16	29,015	70	207,637
September	11	23,301	62	193,647
August	12	21,967	55	160,727
July	21	33,508	60	163,282
June	25	57,920	71	215,594
May	21	34,457	56	141,885
April	27	50,294	82	219,283
March	29	54,379	94	264,101
February	22	41,945	77	236,784
January	23	43,664	86	252,595
December, 1933	19	40,552	90	279,537

Los Angeles

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	225	856,732	203	825,348
September	214	804,221	197	791,324
August	218	801,482	201	785,671
July	198	710,210	186	755,686
June	201	743,198	186	738,880
May	200	754,695	197	738,307
April	186	696,716	167	679,883
March	168	669,548	169	691,230
February	154	629,859	165	624,170
January, 1934	176	686,201	146	616,189

San Francisco

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
October, 1934	152	670,992	156	663,353
September	146	614,180	160	675,941
August	160	699,105	178	781,553
July	118	484,655	119	471,702
June	126	386,966	110	456,027
May	152	452,827	140	593,715
April	165	831,501	169	729,273
March	150	659,251	181	772,219
February	141	503,105	154	659,366
January, 1934	163	722,800	197	764,823

Houston

(Exclusive of Domestic)

Month	Entrances No. ships	Entrances Net tonnage	Clearances No. ships	Clearances Net tonnage
August, 1934	19	76,104	22	88,631
July	24	93,810	24	86,702
June	27	115,730	33	133,108
May	29	109,223	45	132,318
April	31	121,318	40	155,327
March	23	89,200	39	144,546
February	22	88,094	26	99,931
January	23	88,164	37	128,773
December	18	65,566	31	109,206
November, 1933	14	49,486	30	106,943

Note: At the port of Philadelphia, additional vessels in the foreign trade (via other American ports) were 73 of 248,458 net tons entered and 86 of 294,469 net tons cleared for the month of October.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let — Sales — Reconditioning — Launchings — Trial Trips

THE floating dry dock built for the navy by the Dravo Contracting Co. at its Wilmington, Del., plant and then delivered to the navy yard, Philadelphia, for final fitting out, has now arrived at its base at San Diego, Calif. The name of the new dock is ARD-1. The *Army and Navy Journal*. in its Nov. 17 issue gives the following interesting information concerning the new dock:

Designed to accommodate destroyers, submarines, mine sweepers and light craft of the fleet, the floating dry dock is expected to prove an important adjunct to the fighting strength of the force afloat in time of war; especially when the fleet is operating in foreign waters. Towed with the train of the fleet, it is expected to, in some degree, make up for the lack of naval bases, in that it can patch up disabled auxiliary vessels.

Leaving the Philadelphia navy yard Oct. 20, the ARD-1 towed by the U. S. S. BRIDGE, made a record run on its initial voyage averaging about 10 knots. The dock arrived at the Panama canal, Oct. 28, left Balboa for San Diego, Nov. 1, arriving Nov. 14.

The ARD-1 has steering gear to facilitate towing, but no self-propelling machinery. She is 393½ feet overall, with a beam of 60 feet, and has a deadweight tonnage of approximately 2200 tons. It has a typical ship's bow with a hinged gate at the stern.

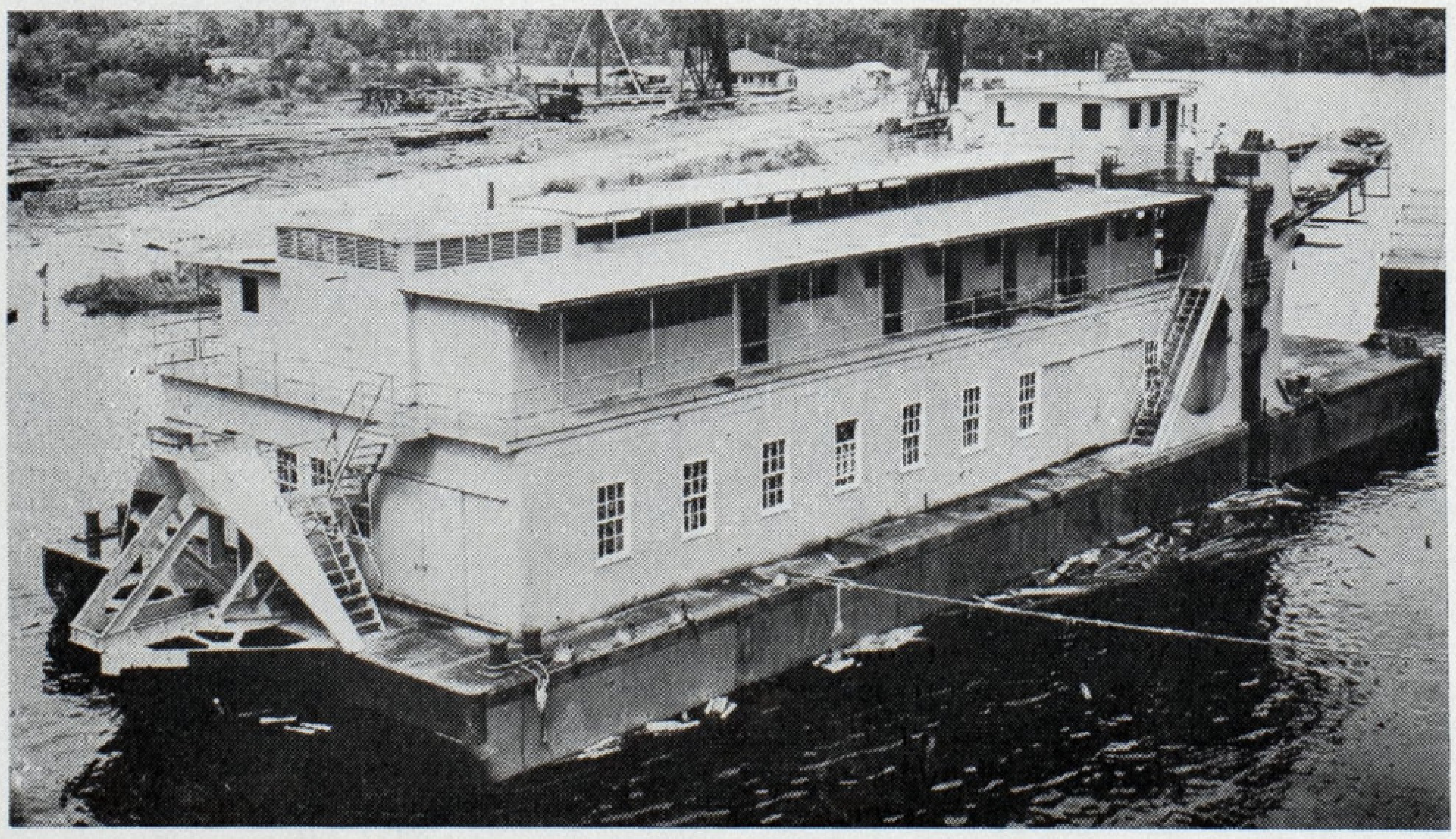
The hull is subdivided for its stability into 16 watertight compartments which can be flooded independently or in combination for sinking the dock to receive a ship. A pumping plant consisting of four 20-inch pumps is provided for pumping out the compartments to raise the dock.

The pumps and the main valves controlling the piping system are electrically operated and remotely controlled from central bench boards. The dock is provided with diesel electric generators which furnish current for operating various motors, with air compressors for general use in connection with repair work performed in the dock, with electric capstans for handling the ship in and out of dock and with fire and flushing water systems, fresh water systems, and ship sewerage systems. The steering gear, flying bridge and stern gate are operated by hydraulic power.

Water level indicators for all compartments are located centrally above the main control bench boards by which the operator may control the trim of the dock intelligently.

The dry dock was authorized by the act of May 14, 1930, which also contained appropriations for its construction. A contract for its construction for the sum of $352,680 was awarded to the Dravo Contracting Co., Wilmington, Del., on March 9, 1934.

In a recent heavy storm at Seattle the 152 foot, wooden stern wheel steamer HARVESTER turned turtle. Other methods failing to right the vessel she was towed upside down for half a mile, a sand bunker built on the offside and with the aid of the port's 125-ton shear leg derrick the wreck was finally turned over and righted. Lines under the hull served to accomplish the task which tugs had been unable to do.



CLAM Shell dredge ALABAMA, *described in the April issue of* MARINE REVIEW, *said to be the first all arc welded dredge ever built. Length 140 feet; beam, 49 feet; depth, 9 feet; weight, 681 tons. Built by Ingalls Iron Works Co., Birmingham, Ala., for the McWilliams Dredging Co., New Orleans. Photo, courtesy of The Lincoln Electric Co., Cleveland*

Northwest Shipbuilding

Built at a cost of $125,000, the wooden motorship BROWN BEAR was launched Nov. 7 at the Puget Sound plant of Winslow Marine Railway & Shipbuilding Co. She was sponsored by Miss Elizabeth Terhune, daughter of H. W. Terhune, executive officer of the Alaska Game commission. The BROWN BEAR will serve as mother ship of a new fleet being completed for the United States bureau of biological survey and the Alaska Game commission. The vessel took the water entirely completed and ready for service. She is 115 feet in length equipped with two 200 horsepower Washington diesel engines. The GRIZZLY BEAR, 58 feet long and to have a 90 horsepower same type diesel, is being completed at the Schertzer yards, Seattle.

Lake Washington Shipyards submitted the low bid of $37,511 for rebuilding the army mine planter GEN. J. FRANKLIN BELL. No announcement has been made by the lighthouse department in the matter of awards for converting Columbia lightship No. 88 from steam to diesel power. The total of the tenders exceeded the amount available. Lake Washington Shipyards was low for reconstruction and Washing Iron Works, Seattle, for furnishing a 350 horsepower diesel engine.

The coast guard cutter MOHAWK, last of three under construction for the United States coast guard by The Pusey & Jones Corp., Wilmington, Del., was launched on Oct. 23. She is to be commissioned early in December.

The United States engineer office, Louisville, Ky., will receive bids until Dec. 11 for furnishing two 750 horsepower propelling engines, one 1600 horsepower dredge engine and one 575-kilowatt generating set, all full diesel type.

The United States engineer office, Duluth, Minn., on Nov. 20 opened bids for drydocking, removing the present boiler, installing a new watertube boiler, and making certain alterations and overall repairs to the United States tug ESSAYONS, located at Sandusky, O.

Marine Exhibition Arouses Much Interest

For two weeks beginning on Nov. 12 the first annual marine exhibition under the auspices of the Maritime Association of the Port of New York continued to attract the attention of all classes of marine men.

The exhibits which covered three floors of the Maritime Exchange building, 80 Broad street, New York, showed the progress being made in marine equipment, materials and service and attracted many visitors. Some ninety exhibitors participated.

One of the features of this marine exhibit was a dedication of separate days for various branches of the industry. Many speakers of prominence addressed the meetings held on these days. Hardly ever before has there been such a concentrated and effective emphasis made on the essential need of a merchant marine.

The value of the marine exhibition to the shipping industry was clearly brought out by Arthur M. Tode, national president of the Propeller Club of the United States, in his address on Propeller club day, when he said:

Value of Exhibition

"In arranging the exhibition the New York Maritime exchange has rendered a distinct service not only to the marine industry as a whole, but I believe to American shipping in particular. It has provided a medium by which steamship companies may acquaint shippers and the general public with the facilities they have provided and maintained for the overseas transportation of our goods and for safe and comfortable passenger travel. It has enabled various federal state and municipal government departments and bureaus to portray the part they play in the maritime world. Perhaps, most important, it has given manufacturers of all kinds of equipment materials and devices the opportunity of acquainting vessel owners and designers with the most modern and up-to-date appliances for the improvement of economy, efficiency and safety in vessel operation."

The man more than any other who is responsible for this first annual marine exhibition is Angelo R. Risso, a member of the Maritime Association of the Port of New York, and associated with the Atlantic Basin Iron Works. It was Mr. Risso who first proposed to the board of directors of the Maritime association that such an exhibition should be held for the purpose of stimulating the shipping industry generally and of fostering a better understanding of its aims and problems. There is no doubt that the exhibition succeeded even beyond expectations and it may very well be that it will be the forerunner of others planned on a still more comprehensive scale.

Merchant Marine Academy of National Scope

That the United States should establish an American merchant marine academy somewhat along the lines of Annapolis is the suggestion recently made by W. I. Sirovich, Democratic member of congress from New York and the ranking member of his party on the congressional committee on the merchant marine.

It is understood that Representative Sirovich, in the house, and Senator Copeland, in the senate, will introduce legislation in support of a strong merchant marine which will include the plan for a national school for the proper training of merchant marine officers.

In this connection it might well be possible to use the present New York State Merchant Marine academy, which has been so successfully built up by Capt. J. H. Tomb, U. S. N., retired, as the nucleus of such a national academy. Some reasons why this should be done are: the New York State Merchant Marine academy is an established going concern; it has an able and experienced personnel; it possesses all the elements for the required plan; it has a considerable and influential alumni body, and it is located in the greatest maritime center of the country. Whatever else is needed, the federal government could readily and economically provide.

Normandie Will Carry an Extensive Personnel

According to present plans, the French superliner NORMANDIE will sail for New York on her maiden voyage May 29. Some conception of the gigantic size of this liner may be had by considering the number of officers in her crew.

In the deck department she will have a master or commander and first and second captain, six officers all holding unlimited licenses as masters, two apprentices, and 108 seamen, making a total in the deck department of 119.

In the engine department, the NORMANDIE will have a chief engineer, 16 engineer officers, 19 assistants, 30 electricians and 130 in the engine department crew, making a total for this department of 196.

Stewards' Department

In what might be termed, generally speaking, the steward's department, the NORMANDIE will carry one head purser, six assistant pursers, three doctors, and two head nurses. There will be 16 musicians, 7 printers, 9 hair dressers, 628 in the service department, 114 cooks, 73 assistant cooks, 10 bakers, 20 bellboys and 25 chambermaids, making a total in this department of 914.

On this basis, the total personnel will be at least 1229.

Bids were to be opened Nov. 26 at the office of the superintendent of the tenth district, lighthouse service, Buffalo, N. Y., for furnishing two each gunboat type boilers, with circulators and sludge removers for the lighthouse tender CROCUS. The proposals did not include the installation of the boilers in the vessel.

On her arrival in New York, Nov. 8, from Bremen, Southampton and Cherbourg, the North German Lloyd express liner, BREMEN, completed the first half of her one hundredth round trip.

Bunker Prices

At New York

	Coal F. o. b. per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Nov. 19, 1934	5.63@5.48	1.20	4.65
Oct. 19	5.63@5.48	1.20	4.65
Sept. 19	5.63@5.48	1.35	4.79
Aug. 18	5.63@5.48	1.35	4.79
July 19	5.63@5.48	1.35	4.79
June 19	5.63@5.48	1.35	4.79
May 18	5.63@5.48	1.35	4.79
April 19	5.63@5.48	1.35	4.79
Mar. 19	5.35@5.20	1.25	4.79
Feb. 19	5.35@5.20	1.25	4.79
Jan. 18	5.35@5.20	1.25	4.79
Dec. 18, 1933	5.35@5.20	1.25	4.79

At Philadelphia

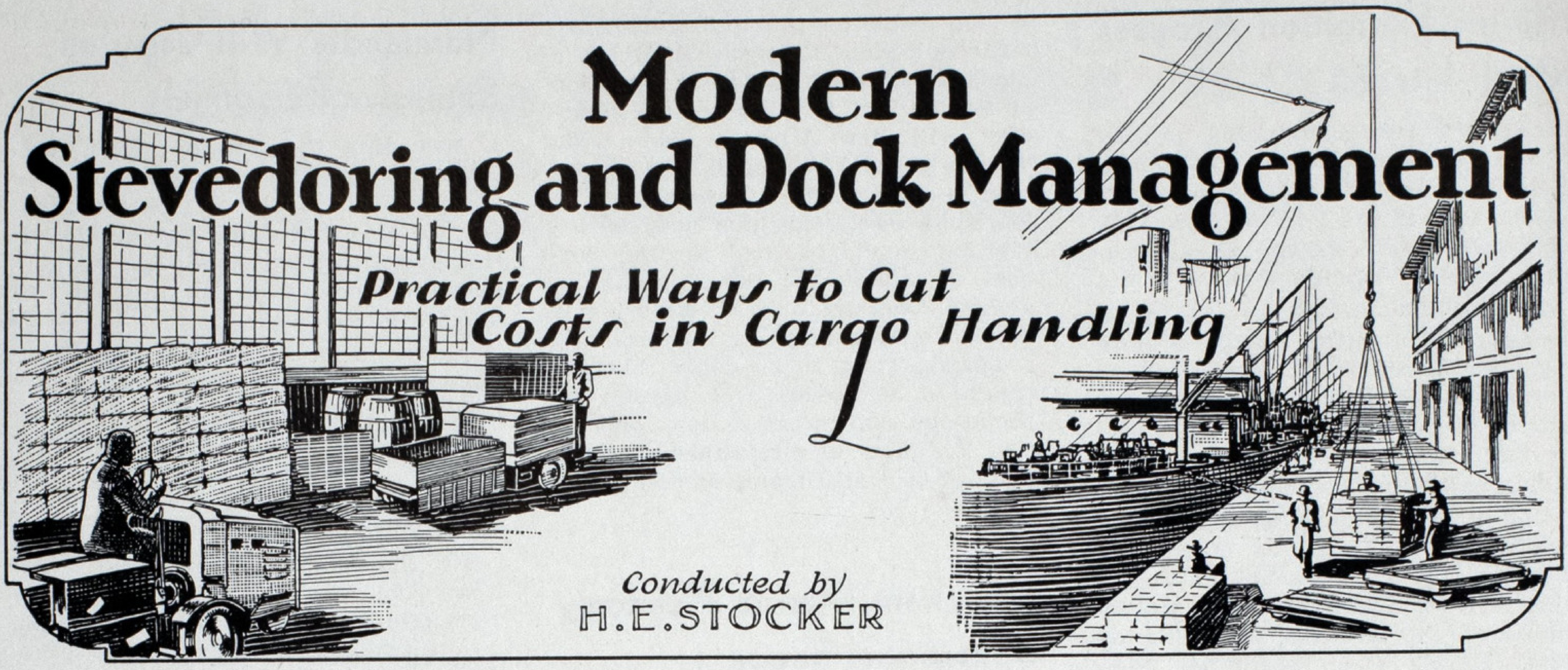
	Coal trim in bulk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Nov. 19, 1934	4.93@4.78	1.20	4.61
Oct. 19	4.93@4.78	1.20	4.61
Sept. 19	4.93@4.78	1.35	4.76
Aug. 18	4.93@4.78	1.35	4.76
July 19	4.93@4.78	1.35	4.76
June 19	4.93@4.78	1.35	4.76
May 18	4.93@4.78	1.35	4.76
April 19	4.93@4.78	1.35	4.76
Mar. 19	4.65@4.50	1.25	4.76
Feb. 19	4.65@4.50	1.25	4.76
Jan. 18	4.65@4.50	1.25	4.76
Dec. 18, 1933	4.65@4.50	1.15	4.76

Other Ports

Nov. 19, 1934

Boston, coal, per ton	$9.00
Boston, oil, f. a. s. per barrel	$1.16
Hampton Roads, coal, per ton, f.o.b. piers	$5.00
Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s –d
Antwerp, coal, per ton	15s 9d
Antwerp, Fuel oil, per ton	—s –d
Antwerp, Diesel oil, per ton	—s –d
British ports, Fuel oil	—s –d
British ports, Diesel oil	—s –d

Note: Figures given for coal at New York and Philadelphia are for Classes A and B according to the Code; Class C is slightly less.



Cargo Handling Costs can be Reduced by Applying Transportation Principles

By H. E. Stocker

THREE principles of transportation were considered in the November issue, the terminal time principle, the handling principle and the mechanical equipment principle. In this article additional principles will be considered.

The fourth principle is the straight line movement which may be stated as, "Economy in transporting cargo is obtained by moving it in a straight line." In manufacturing this is known as the straight line production principle, the ideal application of which is found in factories where the raw material enters the building at one end and goes out—a finished product—at the other end of the building, with cross hauls reduced to the lowest practical minimum.

In cargo handling operations the application of this principle is found on terminals where the cargo is placed so that the hauls from the piles to the ship are reduced to the lowest practical minimum and cross hauling is avoided as far as possible.

Planning Terminal Operations

Contrasted with this careful planning of terminal operations, the author has visited a terminal where there was almost no planning of the operations to avoid unnecessary hauling of cargo on the pier. Cargo for No. 1 hatch was hauled the whole length of the pier and loaded into No. 5 hatch, while cargo opposite No. 5 hatch was hauled the whole length of the pier and loaded into No. 1 hatch. Not only were the hauls longer than necessary, but the pier congestion was increased and operations slowed down by the cross hauling of cargo.

In a general cargo operation, all long hauls and all cross hauling cannot be avoided, but if the operations are directed with the straight line movement principle in mind, the operation will be faster and costs will be reduced.

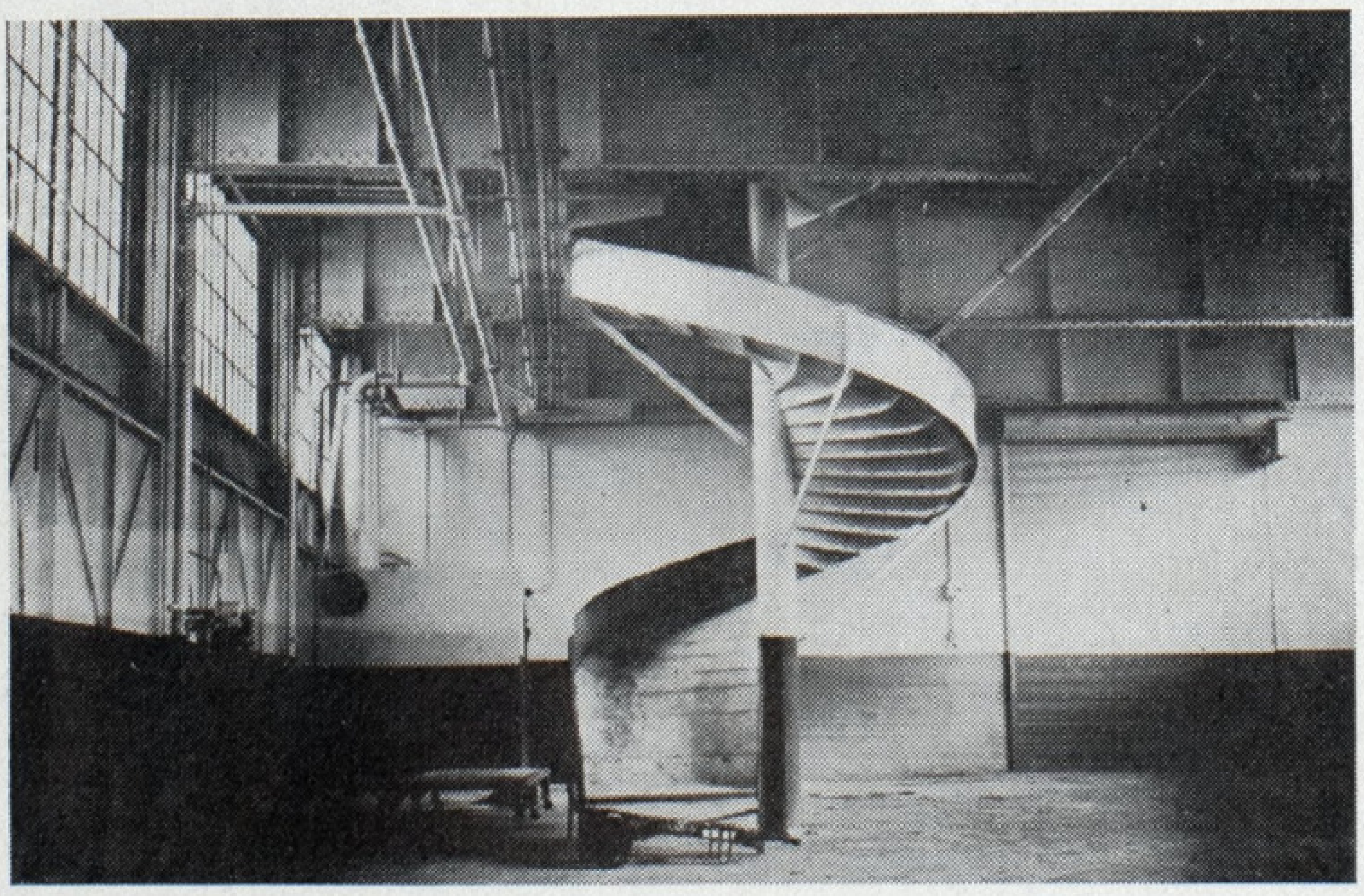
Another application of this principle is found in the use of sideports in vessels. The cargo moves into or out of the vessel in nearly a straight line which is one of the several reasons why sideport operations are more economical than hatches.

The fifth principle may be stated as, "Economy is obtained by reducing the ratio of dead load to revenue load." The application of this principle is shown in the case of cargo shipped on skids. The economy of the skid method varies as the ratio of the dead weight of the skid to the weight of the cargo.

The fifth principle, known as the gravity principle, states that, "Economy is obtained by handling cargo by gravity wherever possible."

Gravity and Conveyors

For example, the author saw a Matson line ship loading at San Francisco, using skids and lift trucks for handling bags of rice from the pier into the 'tweendeck and chutes for sending the cargo into the lower hold. This principle is applied also in loading flour from a warehouse to coast-



Spiral chutes on piers, between decks, are an application of the gravity principle of freight handling

wise vessels. A chute extends from the warehouse into the hatch so that the maximum use is made of gravity in handling the flour.

The Great Lakes Transit Co. unloads freight from the deck houses on its freighters by chutes, while flour is handled through the sideports with twin screw conveyors. At some terminals gravity roller conveyors facilitate greatly the unloading of motor trucks.

The seventh principle states that, "Productivity of equipment is increased by providing good floors, automatic couplers, non-friction bearings, rubber tires and equipment best suited to conditions."

Good floors increase productivity of equipment by speeding movements of tractortrailer trains, crane trucks and other equipment. Speed of movement is reduced when the floors are in poor condition, or are constructed of unsuitable materials, both by the impossibility of moving fast, as well as delays caused by the necessity of stopping to readjust loads which have been jarred by the rough going.

Automatic couplers reduce the terminal time of tractors by facilitating greatly the coupling and uncoupling of trailers, as well as speeding the switching of trailer trains.

There is no logical argument against the provision of automatic couplers on all trailers. The additional cost is offset quickly by the greater effectiveness of the operation.

ment increases as the volume of cargo to be handled increases. In every case there is a minimum point below which the mechanical equipment operates at a loss. Contrary to the opinion of some executives there is no fixed percentage of time which is a guide to economy of mechanical equipment. Each case must be analyzed to determine the point at which mechanical equipment ceases to be profitable.

Limiting Capacity

The ninth principle is known as the principle of diminishing returns. It may be stated as, "The unit cost of transportation increases as the quantity to be transported exceeds the capacity of the plant."

A terminal which can handle 200,000 tons of cargo yearly is uneconomical for handling 250,000 tons of cargo. The increased tonnage can be handled but not economically.

This principle, like all principles, must not be applied blindly. In one case the capacity of the terminal was increased by piling bales of gunnies three high with trucks fitted with a special grab for this class of work.

Frequently when a terminal becomes congested, due to increased volume of cargo, it is possible to decrease the congestion by providing mechanical equipment and modernizing methods, the effect being to increase the capacity of the terminal.

The tenth principle states that, "Productivity is increased by providing working conditions suitable to the task."

Safe equipment and safe working conditions not only decrease insurance costs, but increase the productivity of the operation. The studies which have been made of the relationship of safety and productivity show that productivity is increased by providing high safety standards. Among these is the provision of adequate lighting.

The eleventh principle, the principle of stndardization, which is known as, "The determination of the best practice under any set of conditions is necessary to maximum profits."

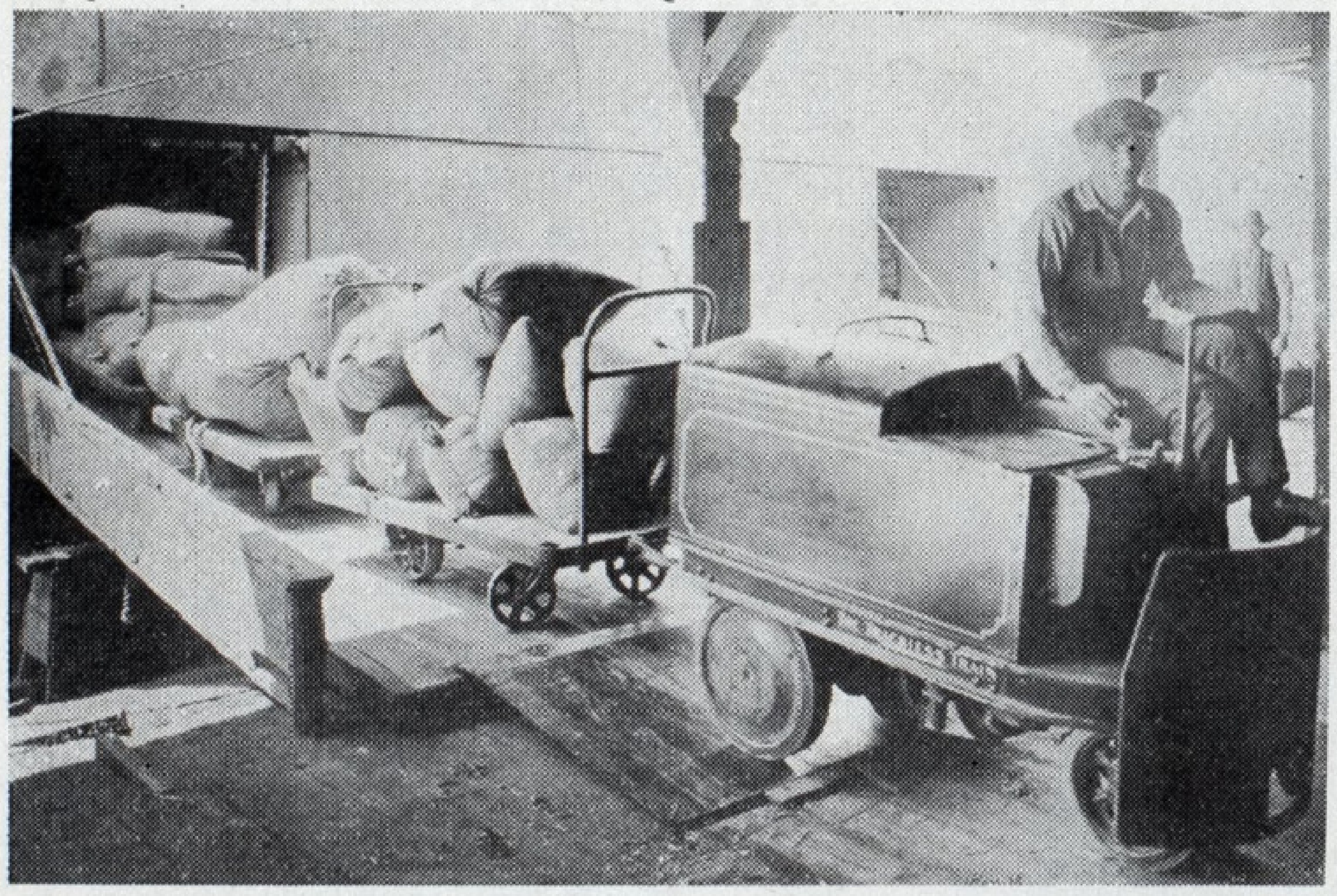
Determination of the one best way of handling flour, canned goods and other cargo on the terminal, and then make that one best way standard practice until experience, experiment or observation of other operations develop a better method.

Versatility, Methods, Equipment

The twelfth principle states that, "Economy in frieght handling is obtanied by providing equipment and methods which are capable of a variety of uses." For example, a lift truck which may be readily converted into a crane truck, or a newsprint truck is more economical for some operations than a truck limited to use as a lift truck.

Another example is found in the winch arrangement on ships. Regardless of the trade in which a ship is to operate, designers should, wherever other conditions permit, place winches close enough together, to be operated by one winch driver because in the life of the ship it is possible that she will operate in a trade where the practice is permitted .

All equipment and methods should be made as flexible as practical to permit economical operation under changing conditions. Cargoes, ships and terminals change, and ships and terminal equipment should be planned to permit handling of cargo under as great a variety of conditions as possible, because in the long run this results in the greatest economy.



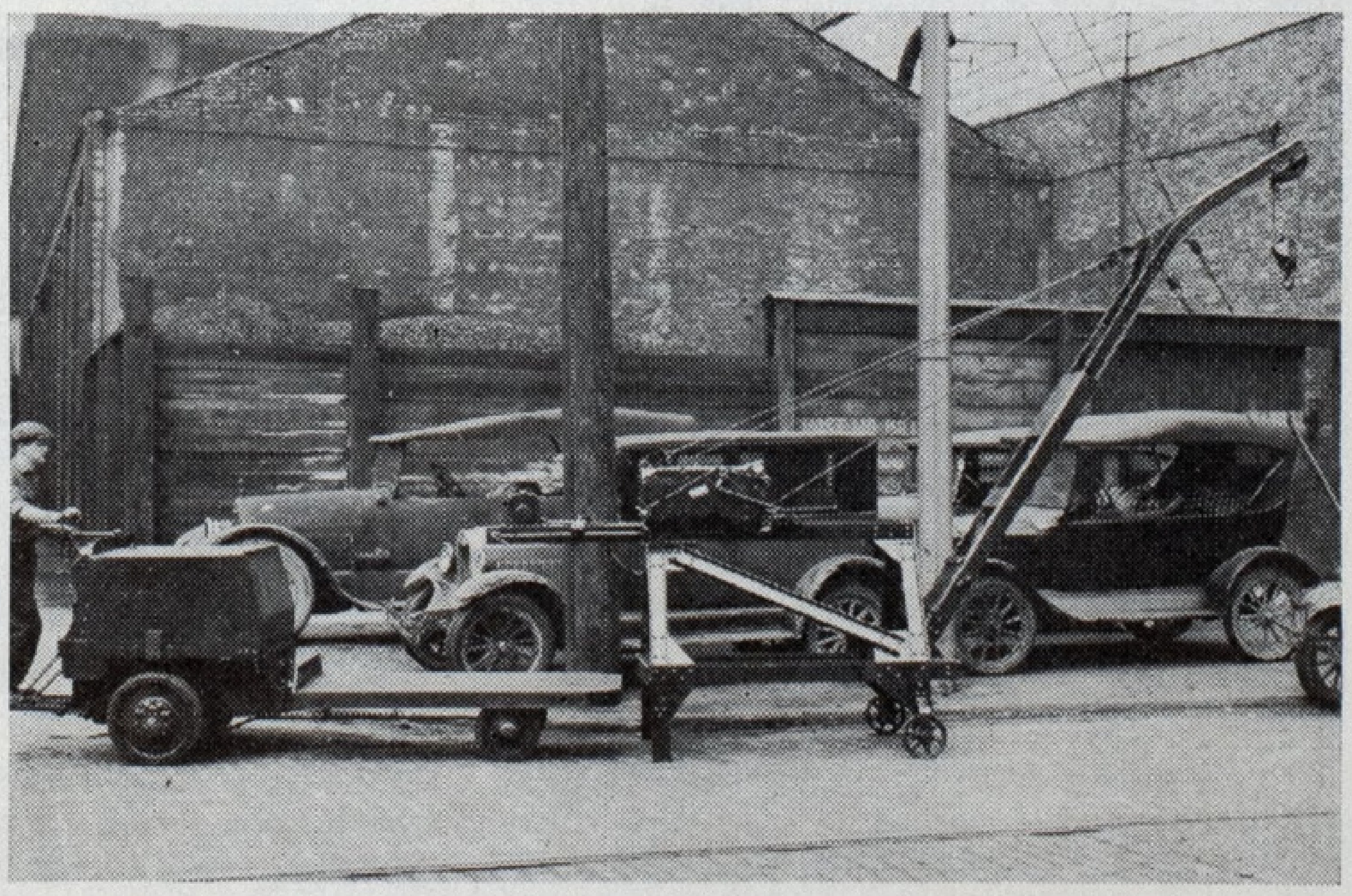
A sideport operation such as this is an example of the straight line movement principle of cargo handling

The provision of non-friction bearings reduces the power—man or mechanical—necessary to move a hand truck or trailer. Roller bearings should be standard equipment for the cargo blocks on ships.

Tests have proved conclusively that rubber tires speed operations and reduce costs. (See July 1932 issue Marine Review.)

The eighth principle states that "The unit cost of transportation decreases as the quantity to be transported increases." This is known generally as the law or principle of increasing returns.

The economy of mechanical equip-



The economy of equipment is increased by designing it to perform more than one type of operation. This lift truck can be fitted with a crane attachment

Measure Stability of Ships With Instrument

By W. Selkirk Owen*

ALL ships under all conditions of loading should have the proper amount of stability; not too much and not to little. No exact means of determining stability directly or easily has heretofore been available. There has now been perfected a truly remarkable instrument for automatically measuring stability. This instrument is known as the stability meter and was invented by J. Lyell Wilson, an American naval architect.

This stability meter can be conveniently installed in the machinery space on the vessel and its dial, which may be located anywhere, will register the existing amount of GM or the metacentric height, in feet or inches, and it can be read by anyone at any time. It is a compact, high-class, electric instrument and occupies but little more space than a man's suitcase.

Stability Determined

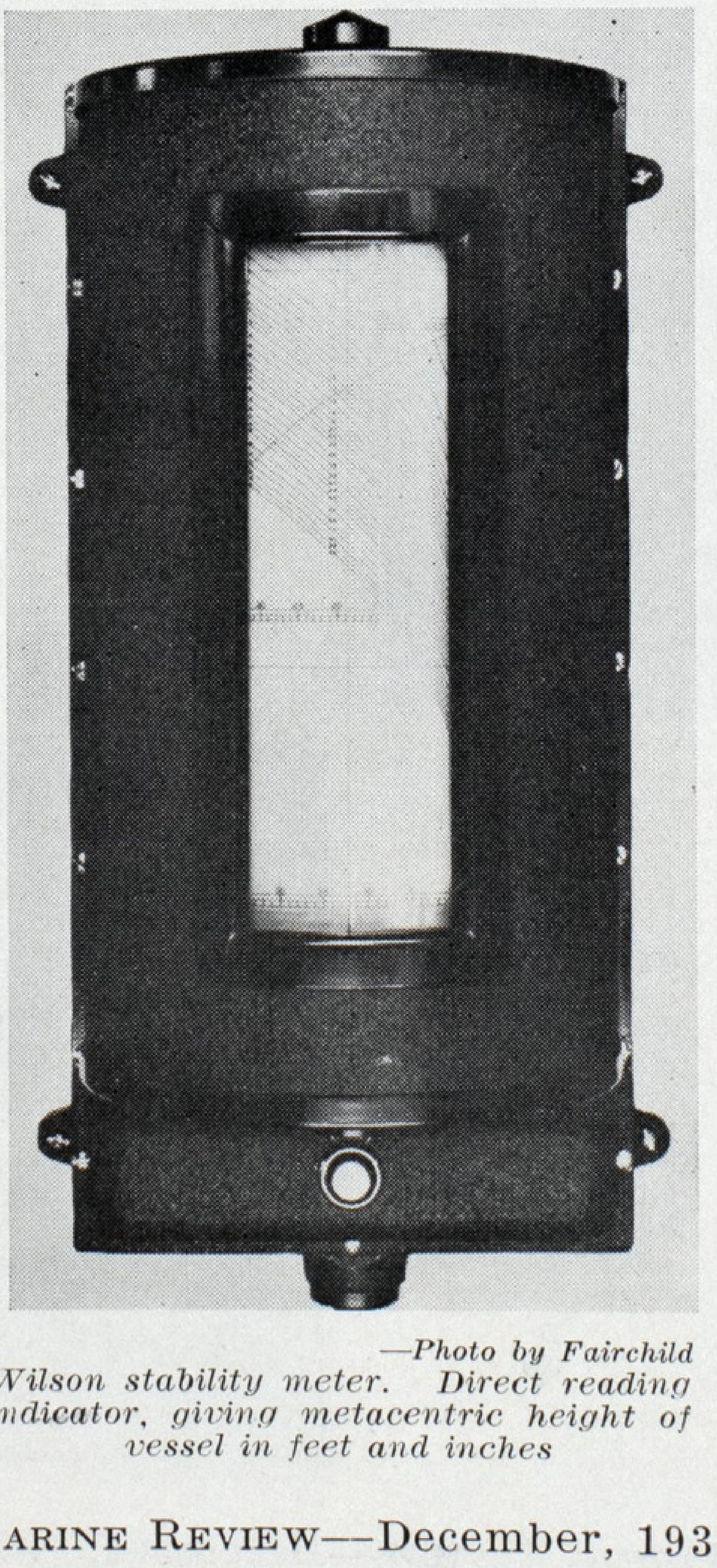
The theory upon which the instrument works is based on mathematical deductions. Metacentric height has a definite mathematical relation to the maximum angle of roll, however small, that occurs at any instant together with the maximum agular velocity of the ship during that roll. This information the stability meter automatically records and combines with a given constant setting of the instrument which is determined by calculation, once and for all, for the particular ship upon which it is being used. The net result is that a final and conclusive answer to the question of what the metacentric height is in feet and inches can be read directly upon the dial of the instrument.

The maximum angle of roll is determined by a small damped pendulum and the maximum angular velocity is recorded as the result of the tilting or precessional movement induced by the ship's velocity upon a small gyroscope revolving at high speed. These two movements are in turn transmitted independently to each branch of a logarithmic slide rule, arranged on transparent concentric cylindrical shells and the answer becomes available immediately as the result of this virtually automatic manipulation of the slide rule by the electrical devices in the instrument.

*The author, W. Selkirk Owen, is professor of naval architecture, Webb Institute of Naval Architecture.

A calculation of the mathematical expression known as the radius of gyration of the material of the ship and its contents must be made to determine the constant setting for the instrument for each particular vessel. This, of course, is work for the expert and when once done and the instrument is installed ready for use its setting need never be disturbed again so long as it remains on that ship. If an instrument should be relocated at any time on another vessel, it would only require a proper resetting to give correct readings for the new ship.

Stability is a changing thing even during the same voyage of the vessel. Fuel and stores are consumed on a trip and may cause a vital change in the position of the center of gravity. It may be necessary to correct such a condition by adding water ballast to the vessel before arrival. The value of the stability meter to the operating personnel on shipboard is obvious. It would give them at all times the exact metacentric height, and thus indicate the necessity for water ballast and the effect on stability produced by such ballast.



—*Photo by Fairchild*

Wilson stability meter. Direct reading indicator, giving metacentric height of vessel in feet and inches

The necessary minimum amount of stability of a merchant vessel is a matter of vital concern to the government in its responsibility for the safety of life at sea of the crew and passengers who embark upon the vessel. The bureau of navigation and steamboat inspection must have the assurance of satisfactory stability qualities of a vessel, along with other matters that affect her seaworthiness. Without such assurance the vessel would not be allowed to depart from port.

It is now required by law that each vessel shall have her stability qualities determined by a satisfactory inclining experiment performed under the direction and supervision of representatives of the bureau of navigation and steamboat inspection. Thereafter it remains for the marine superintendent, after solving his own problems of stability for each voyage, to convince a skeptical government official of the wisdom and correctness of his own judgment in the matter. It is no wonder that differences of opinion arise in such a highly specialized and abstruse technical question. Especially is this so when the opinions of two persons of possibly different temperaments, experience and methods of approaching the subject are required to harmonize.

Save Excessive Ballast

Excessive and unnecessary ballast, with all its attendant economic loss, is too often the only way out. In this instance the government may be polite but it is firm. In the absence of definite and complete information no chances are taken and to make certain to be on the safe side on goes the ballast.

At the international safety of life at sea conference, held in London, in 1929, at which all of the important maritime nations of the world were represented, a great deal of earnest thought and attention was given to the matter of minimum stability requirements for vessels.

J. Lyell Wilson, inventor of the stability meter, is well known among technical men of the shipping industry. He is the assistant chief surveyor of the American Bureau of Shipping. In 1926 he was appointed technical assistant to the committee on stability. As a result of his special preparatory studies and investigations of the subject of stability, he recognized the need and advantage of an instrument for its direct determination. This instrument has now been perfected after years of patient effort and experimentation, and its practical value has been demonstrated on various vessels. Shipowners' have co-operated in making it possible to obtain valuable data pertaining to the economical operation of the vessel.

Useful Hints on Cargo Handling

WHENEVER it becomes necessary to install special cargo fittings in addition to the permanent construction, care should be taken to see that they are adequately tested for strength and stability before cargo is loaded.

In one instance where a ship was carrying grain in the lower hold it was desired to load bulk cargo in the 'tweendeck. A temporary bulkhead was constructed of timbers by the ship's crew and shore carpenter which extended part way across the 'tweendeck hatch opening.

After loading of the bulk cargo in the 'tweendeck had been about half completed, the bulkhead gave way and the cargo was precipitated into the lower hold on top of the grain. This caused a contamination of the grain and a loss of part of the cargo stowed in the 'tweendeck. Investigation disclosed that the bulkhead collapsed because the nails used were too short and the supports for the bulkhead had not been properly secured.

In another instance a false 'tweendeck or platform was installed in a vessel in order to increase her capacity for carrying unboxed automobiles. During the voyage one of the supports gave way, causing the platform to collapse, resulting in considerable damage to valuable cargo.

It is suggested that when changes are made in the ship's fittings for the accommodation of special cargo, such fittings be inspected and tested by experienced engineers or surveyors.

Cooperation for Economy

Closer co-operation between the various officials concerned with materials handling operations would result in economies to all concerned. A recent investigation disclosed an operation the costs of which could have been greatly reduced by such co-operation.

A gang of men were employed, using hand trucks, carrying coffee in bags from a warehouse to a point on the bulkhead, about 150 feet distant. Arriving at the bulkhead the load of coffee, five bags per truck, was dumped on the ground. A different gang reloaded the coffee onto another set of hand trucks and trucked it into a lighter moored to the bulkhead. The second gang took but four bags per truck, which resulted in a piling up of coffee on the bulkhead. Proper co-operation would have utilized both sets of trucks, the men coming from the warehouse depositing the loaded trucks at the entrance to the lighter gangway and returning to the warehouse with empty trucks to be refilled. By so doing fewer men could have been used for this simple operation.

THIS page is being devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

Using a Crane Truck

One of the more progressive stevedores at New York saves time in loading the vessels of some of the deep water lines by using cranes.

This stevedore makes up slingloads of cargo at the point on the pier at which packages have been deposited by the trucks of the shipper. The slingloads are made up by men at the pile and a crane truck picks them up, carries the load to the shipside, where it is hooked onto the ships' tackle.

The crane truck then picks up a few empty slings, depositing them wherever they are needed while enroute to pick up another slingload. Used in conjunction with hand trucks and trailers, this method saves both time and money.

On Following Through

One of the steamship lines operating out of the port of New York utilizes mechanical equipment for discharging its ships and then reverts to the oldest methods known to man to stow the cargo on its pier.

Cargo cranes are used to lift bags of coffee and coconuts from the lower 'tween decks and the holds to the main 'tween decks. Here the bags are placed on electrical belt conveyors and passed out to the pier. On the pier the bags are received on a platform about four feet high, from which the longshoremen hump the bags to their respective piles which are designated by one man slapping each bag with a small stick and shouting out the number of the pile to which each particular bag belongs.

The use of mechanical equipment such as cargo cranes and mechanical belt conveyors should be supplemented with skids and lift trucks in order to get the highest efficiency out of the mechanical equipment utilized.

Handling Costs Reduced

One steamship company operating out of New York recently saved one of its shippers quite a sum by the application of modern management methods to materials handling operations. The steamship line received 20 tons of fire bricks at its pier. The brick was delivered by truck. Trailers were placed in the rear of the truck and two wooden sling platforms were placed on the trailer. The brick was loaded directly onto the sling boards. When the two sling boards were loaded, the trailer was moved away and another, similarly equipped took its place behind the truck. The bricks were then strapped to the sling boards by means of steel straps. The loaded sling boards were then hoisted into the ship.

Upon arriving at destination, which happened to be a foreign port in the tropics, equipped with railroad sidings, the loaded sling boards were landed on the wharf alongside the tracks on which flat cars had been spotted. Cheap native labor then stripped the skids and loaded the brick onto the flat cars by hand. The empty sling boards were then picked up by the ship's tackle, hoisted aboard, and returned to New York, thus avoiding the necessity of making entry of the skids at the foreign port and the clearance for the trip back to New York. The total cost of the shippers for this operation was the cost of the steel used for strapping the bricks to the slingboards.

Height of Lift Trucks

The height to which many of the various lift trucks can tier freight can be increased by building a portable platform to go on the platform of the lift truck. An operation was recently observed in the handling of newsprint paper in rolls, a cradle about four feet high being provided on the platform of the lift truck. This cradle increased the tiering ability of the truck by 4 feet.

Up and Down the Great Lakes

Bulk Freight Declines — Lake Levels — Ore Shipments Less — American & Canadian Grain—Coal Movement—Illinois Waterway

TOTAL traffic through the United States and Canadian locks at Sauul Ste. Marie during October, 1934, was 5,005,676 tons as compared with 7,154,293 tons in October, 1933, a decrease of 2,148,617 tons. The chief factors in reducing the tonnage were light shipments of wheat and iron ore. Wheat decreased from 28,910,342 bushels to 22,169,093 bushels and iron ore from 4,782,866 tons to 2,688,254 tons. Bituminous coal shipments increased from 888,651 tons to 1,157,853 tons, but anthracite coal decreased from 56,664 tons to 7654 tons.

Shipments through the Welland canal during October this year were 1,330,721 tons, as against 1,352,644 tons for October, 1933. Wheat was lighter by 198,244 tons, or 6,608,133 bushels; corn by 38,198 tons and oats by 17,534 tons. Rye shipments increased by 37,267 tons, all of it being upbound; cement, brick and lime, by 16,323 tons; iron and steel by 21,818 tons; gasoline by 32,460 tons; pulpwood by 17,727 tons and bituminous coal by 99,889 tons. From the opening of navigation on April 17 to October 31 this year, total traffic through the Welland ship canal amounted to 7,885,651 tons as against 7,993,679 tons in 1933.

Freight using the St. Lawrence canals during October this year was lighter than in October, 1933, by 4571 tons, decreasing from 1,040,854 to 1,036,283 tons. The large decreases were: Wheat, 75,586 tons; pulpwood, 24,173 tons; paper, 7983 tons; oats, 6806 tons; and anthracite coal, 5700 tons. Barley shipments increased over 1933 by 24,581 tons; rye by 37,742 tons; bituminous coal by 28,093 tons and petroleum and other oils by 11,049 tons. For the season up to the end of October, 5,737,802 tons of freight transited the canals, as against 6,170,762 tons for the same period in 1933.

Ore Shipments Decrease

Shipments of ore from upper lake ports during October this year amounted to 2,640,823 tons as compared with 4,542,510 tons for the month of October, 1933. This represents a decrease of 41.86 per cent.

For the season up to Nov. 1, 1934, a total of 21,765,409 tons of ore were shipped from upper lake ports, as compared with 20,842,083 tons for the same period last year. Balance of ore on docks at Lake Erie ports on Nov. 1, 1934, was 5,284,816 tons, as compared with 5,335,885 tons for the same date last year.

Ore shipments by rail from Lake Erie ports to furnaces during October amounted to 1,103,091 tons, making a total of 10,797,599 tons for the season up to Nov. 1, as compared with a total shipment of 11,445,387 tons for the same period in 1933.

October Lake Levels

The United States Lake survey reports the following monthly mean stages of the Great Lakes for the month of October, 1934, determined from daily readings of staff gages:

Lakes	Feet above mean sea level
Superior	602.98
Michigan-Huron	577.70
St. Clair	572.93
Erie	569.87
Ontario	243.09

Lake Superior was 0.11 foot higher than in September and it was 0.13 foot above the October stage of a year ago.

Lakes Michigan-Huron were 0.20 foot lower than in September and they were 0.20 foot below the October stage of a year ago, 1.42 feet below the average stage of October of the last ten years.

Lake Erie was 0.28 foot lower than in September and it was 0.72 foot below the October stage of a year ago, 1.59 feet below the average stage of October of the last ten years.

Lake Ontario was 0.23 foot lower than in September and it was 0.76 foot below the October stage of a year ago, 2.04 feet below the average stage of October of the last ten years.

The Illinois Waterway

Shipments by the Federal Barge line of the Inland Waterways Corp. on the Illinois waterway were twice as heavy this year as in 1933, according to a bulletin published by the traffic department at Peoria, Ill. The increase was made despite low water conditions throughout the season.

Last year the total tonnage carried was 275,000 tons. The waterway was not open into Chicago until June, 1933, consequently 1934 is the first full year of operation. Chicago tonnage has been increasing steadily. Twe fleets carrying coal and oil have been operating steadily all season in addition to the service of the Federal Barge line.

The movement of grain from the Illinois valley has increased heavily. Sand and gravel, owing to the fact that one company which operated on the Illinois waterway in 1933 transferred much of its activity this season to the upper Mississippi, will show a small decrease. The last northbound tow of the Federal Barge line for the season left New Orleans early in November.

American Grain Shipments

Lake shipments of grain from Chicago during October included 2,785,000 bushels of corn, 1,745,000 bushels of wheat and 215,000 barrels of flour. This brought total shipments from the opening of navigation to Nov. 1 to 22,498,000 bushels of corn, 10,386,000 bushels of wheat, 1,849,000 bushels of oats, 319,000 bushels of rye and 947,000 bushels of flour.

Grain imports at Chicago from July 1 to Nov. 1 included 4,918,000 bushels of rye and 890,000 bushels of oats. One cargo of 300,000 bushels of oats was received from Argentina for shipment to Cedar Rapids, Ia. Rye was received from Canada, Poland and Russia.

More than 36,000,000 bushels of grain was moved from Duluth from the opening of lake navigation to Nov. 1. Wheat lead with shipments of 17,914,669 bushels, nearly all of which went to Buffalo. Toledo, Cleveland, Detroit and Milwaukee received less than 2,000,000 bushels. Oats ranked second in traffic with 7,534,990 busheles, the bulk going to Buffalo and Toledo. Corn shipments totaled 5,992,506 bushels, while the movement of barley was 3,616,942 bushels, rye 1,189,198 bushels and flax 198,850 bushels.

The passenger service between Detroit and Cleveland, operated by the Detroit & Cleveland Navigation Co., closed for the season with the sailing for Detroit on Nov. 10. The Cleveland & Buffalo Transit Co., plying between Buffalo and Cleveland, closed its passenger service on Oct. 13. Both companies are operating a freight service.

Canadian Grain Shipments From Upper Lakes

Shipments of grain from Fort William and Port Arthur, Ont., from Oct. 15 to Nov. 14 inclusive, were as follows: Wheat to Canadian lower lake ports, 11,771,117 bushels; to Montreal, 1,613,297 bushels; to other Canadian ports, 392,162 bushels; to Buffalo, 6,815,928 bushels and to other United States ports, 1,628,100 bushels. This makes a total of 22,-220,604 bushels of wheat shipped via lake vessels from Fort William and Port Arthur from Oct. 15 to Nov. 14, both inclusive.

During the same period oats moved from the same ports in the following quantities: to Canadian lower lake ports, 853,654 bushels; to other Canadian ports, 29,172; to Buffalo, 250,-000; and to other United States ports, 813,761. The movement of barley was as follows: to Canadian lower lake ports, 665,003 bushels; to Montreal, 238,714 bushels; to other Canadian ports, 39,495; to Buffalo, 180,000; and to other United States ports, 1,469,054 bushels. The only flaxseed moved was 59,187 bushels to Canadian lower lake ports. Only 60,000 bushels of rye moved to Canadian lower lake ports during this period. Screenings moved as follows: to Canadian lower lake ports, 416 tons; to Montreal, 1600 tons; to Buffalo, 1026 tons; and to other United States ports, 3580 tons. The only movement of barley malt was 2,701,310 pounds to Montreal.

The grand total in all kinds of grain shipped via lake vessels from Fort William and Port Arthur, Oct. 15 to Nov. 14, both inclusive, was 26,934,921 bushels; and 6622 tons of screenings.

Ralph M. Dravo Dies

Ralph M. Dravo, 66, president of The Dravo Contracting Co., Pittsburgh, and chairman of the board of Dravo Corp., died Nov. 11 at his home in Sewickley Heights, Pa.

Mr. Dravo entered the employ of Illinois Steel Co., in 1889, after he graduated from Lehigh university. Later, he worked for the Carnegie Steel Co.'s Edgar Thomson works at Pittsburgh, but shortly thereafter, joined his brother in the F. R. Dravo & Co., which the brother had founded.

The concern has since grown to be widely known both in the building and marine fields. Mr. Dravo was a director of Dravo-Doyle Co., Keystone Sand & Supply Co., Union Barge Line Corp., Davison Coke & Iron Co., and the Pitt National bank, all of Pittsburgh. He was also a director of a number of other companies.

He was a member of the Carnegie Hero Fund commission and one of the trustees of Lehigh university. Numerous social clubs in Pittsburgh made up the balance of his affiliation.

J. D. Berg has been elected chairman of the board and V. B. Edwards has been elected president of the Dravo Corp., Pittsburgh, succeeding the late Mr. Dravo. A. W. Dunn was elected executive vice president of the Dravo Corp.

J. S. Miller was elected president of the Dravo Contracting Co., Pittsburgh and at tht same time, W. K. Fich was named president of the Dravo-Doyle Co., Pittsburgh.

Captain Fried Appointed Supervising Inspector

In the appointment of Capt. George Fried as supervising inspector of the second district with headquarters at New York, President Roosevelt has selected for this important post one of America's outstanding shipmasters. Time and again he has been the central figure in notable rescues at sea. Until recently he was master of the United States liner WASHINGTON.

His last connection with a rescue at sea was on Oct. 18 when, as commander of the WASHINGTON, a lifeboat from that liner picked up five men from newsreel company's airplane after it had come down on the sea in damaged condition. For this service Captain Fried and chief officer Ralph C. Dooley and ten members of the crew were awarded the first distinguished service medals of the United States lines.

In referring to the appointment of Captain Fried, Daniel C. Roper, secretary of commerce, pointed out that as supervisor of the second district he will be in charge for the government in the greatest shipping center of the country including New York, New Jersey, Philadelphia and Long Island. Mr. Roper said in part:

"He will be responsible for the inspection of new vessels, and the annual inspection of all steamships in the area, for the enforcement of the regulations governing fire prevention, fire drills and the training of crews. Foreign vessels as well as American flag vessels plying the ports in the district will come under his supervision. He will be in charge of all licenses, the promotion of merchant marine officers and investigation of marine accidents in the district."

Captain Fried succeeds John L. Crone, retired.

The Melbourne Steamship Co. Ltd., recently placed an order with Swan, Hunter & Wigham Richardson Ltd., England, for a large passenger and cargo carrying motorship for Australian coastwise service.

The new ship, over 10,000 tons gross, is to be about 472 feet long and 65 feet, 3 inches in beam. She will have a cargo capacity of about 8500 tons and a speed of 17 knots. Accommodations are to be provided for about 400.

Coal Shipments Heavier Than Last Year

Bituminous coal shipments via lake vessels from Lake Erie ports from the beginning of the season up to 7 a. m. Nov. 19 amounted to 33,336,305 net tons of cargo and 1,060,939 net tons of bunkers, giving a total of 34,397,244 net tons. This is an increase of 3,770,990 tons over the same period last year and it is 10,744,122 tons more than the movement for the same period of 1932. It is also 3,629,937 tons more than the movement for the corresponding period of 1931. These figures have been prepared by the Ore & Coal Exchange, Cleveland.

During the same period in 1933, the cargo coal moved amounted to 29,685,766 tons and the bunker coal 940,488 tons, making a total of 30,626,254 net tons. Also in the like period of 1932, cargo, bunkers and total bituminous coal shipments were respectively 23,076,930 tons, 576,192 tons and 23,653,122 net tons. For the same period in 1931, cargo, bunkers and total were respectively, 29,816,156 tons, 951,-151 tons, and 30,767,307 net tons.

Average shipments of bituminous coal for each of the five weeks ending 7 a. m. Nov. 19 totaled 921,720 net tons of cargo, and 25,977 net tons of bunkers.

Anthracite coal shipments on the lakes for the season up to Nov. 1 amounted to 534,385 long tons. For the same period in 1933 the amount was 359,717 long tons, and in 1932, the amount was 253,753 long tons.

Ship Welding Instruction

It is estimated that a total of about 650,000 pounds of welding electrodes will be required in building the two heavy cruisers and the four 1850-ton destroyers that the Bethlehem Shipbuilding Corp. has under contract from the United States navy. The peak labor load will include about 200 welding operators. In order to train a sufficient number of competent welders, the company has set up at its Fore River plant a welding school. This school is conducted by the foreman of the welding department. About 200 hours of training are required to develop an operator sufficiently to pass the qualification test.

The course is carried out in accordance with a welding manual developed at the plant and which contains the following chapters: Metallic arc welding, fundamentals; general safety precautions; how to run a bead; handling the arc; placing the arc accurately; filling craters smoothly; flat tee joint; flat lap joint; and many others.

Peace, River Towboat

(*Continued from Page* 19)

mored cable such as is used on naval vssels. Each circuit becomes a permanent trouble-free installation and there can be no possiible ground or shorts except through the most severe mechanical injury. A storage battery is provided to float on the line to give a steady current at all times and to furnish a source of power during shut-down periods.

The comfort and even the entertainment of the crew has been given careful attention. Fans are provided throughout the living spaces and radio connections are fitted in the pilot house and the lounge. Chromium plated hardware in the pilot house and corridors adds a modern touch. Watercoolers are installed in the pilot house and mess room, and there is a drinking fountain in the engine room. Two large, modern hotel type refrigerators are installed, with their operating mechanism down below in the engine room. The range in the galley is oil fired and practically automatic in operation. A monel metal two-compartment sink is provided. A garbage chute with flushing out system is installed in the galley. A completely equipped laundry is located on the main deck, with washers and ironing machinery, of a capacity to handle the entire laundry of the crew on the long down river stretches.

This modern towboat has been built in accordance with the rules and regulations and to the inspection of the American Bureau of Shipping. Her classification certificate covers hull, engines, and equipment. All regulations of the United States steamboat inspection service, United States public health service and custom house requirements have been fully met.

Modern Merchandising for Shipping Industry

Speaking at the marine exhibition in New York, recently, Frank Lovejoy, sales executive of the Socony-Vacuum Oil Co. Inc., suggested that there is a real job of modern merchandising to be done in the shipping business today. Such a program entails showmanship, color, and publicity, Mr. Lovejoy pointed out.

"Tell the American public your story—dramatize it in a way to appeal to the imagination," he said. "The facilities are here to greatly expand activity. The shipping interests have just begun to tell the whole story. A big job of modern merchandising, replete with showmanship remains to be undertaken," added Mr. Lovejoy.

Propeller Club Convention at Savannah

The eighth annual convention of the Propeller club of the United States and a national marine conference was held at Savannah, Ga., Nov. 1 to 3.

It was also attended by leaders in maritime affairs in connection with the merchant marine conference. This conference was presided over by James Craig Peacock, director of the shipping board bureau. Addresses were made by H. Gerrish Smith, president of the National Council of American Shipbuilders; R. J. Baker, president of the American Steamship Owners' association, Lachlan Macleay, executive vice president of the Mississippi Valley association; D. N. Hoover, assistant director of the Bureau of Navigation and Steamboat Inspection; George A. Marr, vice president, Lake Carriers' association; Capt. J. H. Tomb, U. S. N., retired, superintendent, of the New York State Merchant Marine academy; and others.

It was decided that the convention next year is to be held on board of a lake steamer enroute to the ports of Buffalo, Cleveland, Toledo, and Detroit.

Arthur M. Tode, New York, was reelected president; H. J. Harding, New York, secretary, and J. H. Godwin, Norfolk, treasurer.

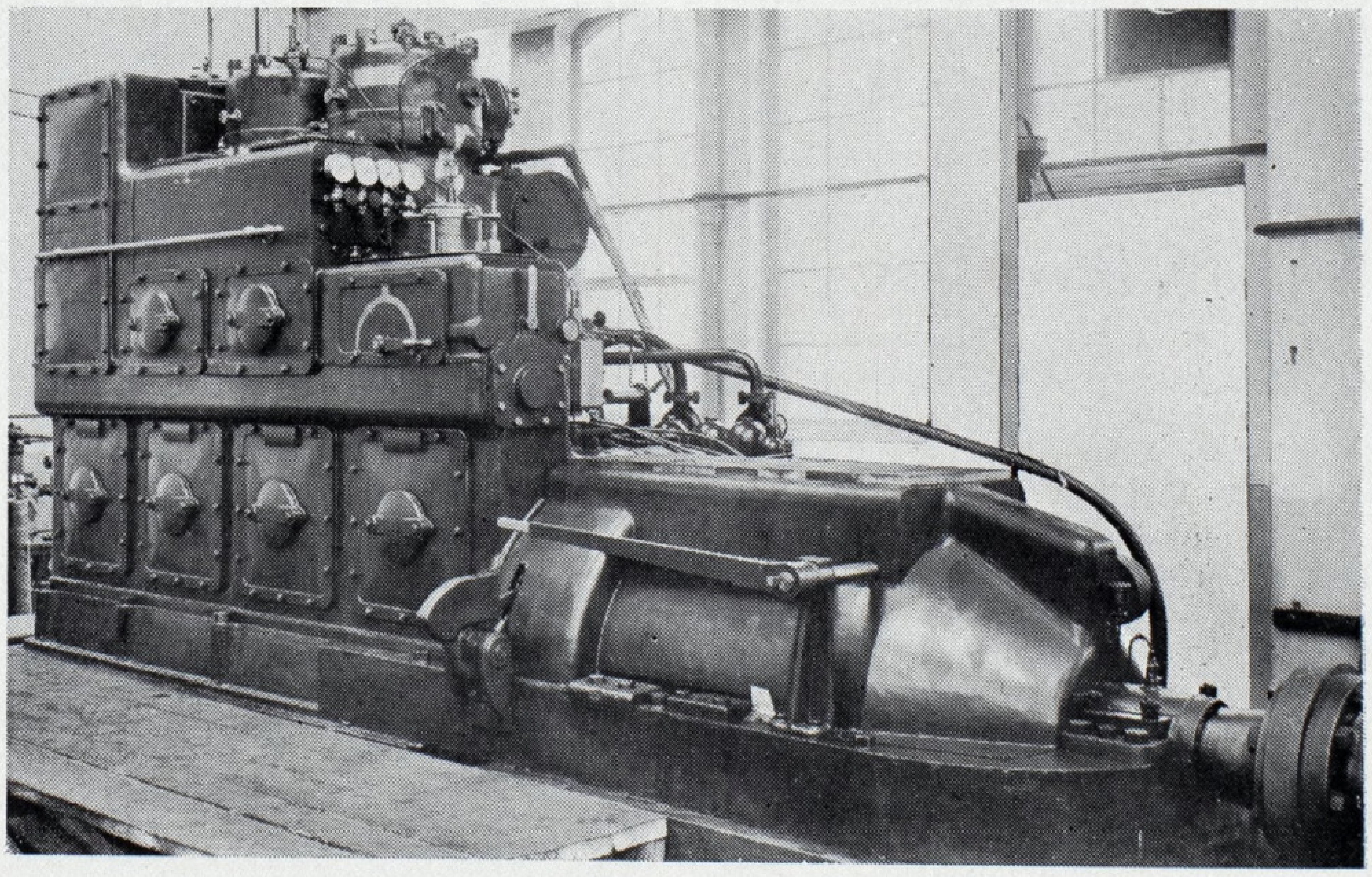
New Type Diesel Engine in Small Freighter

THE accompanying illustration shows a 250 brake horsepower Bolinders diesel engine recently installed in a new, wooden hull, freight and passenger vessel named the LADY SLATER built by Rayal B. Bodden for the Cayman Islands & Gulf Motorboat Co., Cayman Islands, British West Indies.

Though the Bolinders Co., Sweden, is well known all over the world for its low pressure oil engine, this is the first diesel engine manufactured by this company, to be installed in a vessel on this side of the Atlantic.

The engine is of two stroke cycle, single acting type with mechanical or solid injection of the fuel. It is particularly suitable for marine use.

The engine shown has two cylinders and a built-in reversing gear. The engine is started on compressed air and the direction of rotation of the propeller is reversed by means of the gear mentioned above. A separate pump supplies air for scavenging. The pistons are oil cooled. The bore of the cylinders is 13 inches and the stroke is 18 15/16 inches. The rated power of the engine is 250 brake horsepower at 275 revolutions per minute. The length of this engine is 17 feet, 3 inches; the height is 7 feet, 10½ inches; and the width is 4 feet, 3¼ inches. These dimensions are overall. The total weight is 31,000 pounds.



Bolinders Diesel Engine, 250 B.H.P. @ 275 R.P.M. for Marine Service

The vessel in which this engine is installed is 102 feet in length between perpendiculars; 23 feet, 4 inches in beam; and the deadweight is 235 tons. The engine is direct connected to a 3-bladed propeller, 4 feet, 10 inches in diameter and 3 feet, 9 inches in pitch. Fuel consumption is at the rate of 0.42 pound per horsepower per hour. Speed of the vessels is estimated at about 9 miles per hour.

Personal Sketches of Marine Men

John F. Metten, President, New York Shipbuilding Corp.

RECOGNIZED both at home and abroad for his accompishments in marine engineering, he is also an able executive of wide experience.

BEGINNING at the age of 16 as a machinist apprentice, he is a shipyard man with an intimate knowledge of shipbuilding methods and personnel.

THOUGH responsible for many innovations in naval and merchant marine design his name stands for reliability and economical operation.

THE selection of John Farrell Metten as president of the New York Shipbuilding Corp. brings to that office a man of high talent in marine engineering with an intimate knowledge of shipyard personnel and methods, an executive of broad experience and acquaintanceship. His election followed the resignation, on Oct. 19, of Clinton L. Bardo who had been at the helm for the past eight years.

Mr. Metten is a thorough going shipyard man. His steady advancements have been hard-earned in an exacting practical environment. Raised on a farm, he began his career at the age of 16 as a machinist apprentice and then served as erecting department machinist and draftsman at the Newport News Shipbuilding & Dry Dock Co. During the following 25 years, he was chief draftsman, chief engineer, and vice president of the old Cramp shipyard.

After the Cramp yard discontinued operation, he undertook, as president of the Marine Engineering Corp., the first standardization of design for naval vessels building in private shipyards and navy yards. The new United States cruisers Nos. 24-31, under construction at three private yards and two navy yards, were built from identical plans prepared under his direction. He later became vice president of the New York Shipbuilding Corp. in charge of hull and machinery design.

A pioneer in marine engineering developments—he holds numerous active patents on turbine design, marine propulsions systems and auxiliaries — Mr. Metten is noted for conservatism based on sound practice and common sense. In both the navy and the merchant marine, his name stands for simplicity of design, reliability and economical operation. He has won worldwide recognition as an unusually talented engineer. Without the aid of a formal college training, his accomplishments are based on self-schooling, private research and hard work. In June 1928, Lehigh university, in recognition of his achievements, conferred upon him the degree of doctor of engineering.

Among examples of his work are many naval and merchant vessels with fine records in service. There is the battleship WYOMING, famous flagship of the Atlantic fleet, dubbed "Old Reliable" by her crew; and the propelling machinery of the Fall River liner, COMMONWEALTH, one of the largest paddle engines in the world. He was the designer of the first large American direct turbine drives, in the liners GREAT NORTHERN and NORTHERN PACIFIC, the former a troop transport record holder in the World war. He was also responsible for the first large American turbine reduction geared drives, in the liners SIBONEY and ORIZABA.

His engineering design went into many destroyers, holders of the coveted engineering pennant, including 46 destroyers built by Cramp during the war period and still in service. Among these is the destroyer COLE which attained the record speed of 41.17 knots on a special trial. The United States scout cruisers, RICHMOND, MARBLEHEAD, TRENTON, and MEMPHIS, leaders, in order, in navy engineering competition for vessels of their class, are examples of his work.

He was consulting engineer for the modern passenger liners MARIPOSA, LURLINE and MONTEREY, and he took an active part in the design of the engineering features of the liners MANHATTAN and WASHINGTON, now operating so successfully in the transatlantic trade. He was the originator of the builder's design, accepted by the navy department, for the 1850-ton destroyers and 10,000-ton light and heavy cruisers of the 1933 and 1934 building program.

Through it all, Mr. Metten has worked quietly, confident that a job well done will receive the recognition it deserves. He is a member of the Franklin Institute, The American Society of Naval Engineers, The Society of Naval Architects and Marine Engineers, American Society of Mechanical Engineers, Institution of Naval Architects, New York Geographical Society and the American Society for the Advancement of Science.

Reviews of Late Books

The Docks Regulations, 1934, issued by the British government; paper; 15 pages; 9¾ x 6 inches; printed and published by His Majesty's Stationery Office; supplied by The British Library of Information, 270 Madison avenue, New York, or by MARINE REVIEW and in Europe by The Penton Publishing Co., Ltd., Caxton House, London.

This little pamphlet contains the docks regulations, dated March 5, 1934, made by the secretary of state, under section 79 of the factory and workshop act. It has to do with regulations pertaining to the processes of loading, unloading, moving and handling goods in, on, or at any dock, wharf, or quay, and also the processes of loading, unloading, and coaling any ship in any dock, harbor or canal.

These regulations apply to British shipping. The pamphlet will be of interest to steamship owners everywhere because the regulations embody the experience over years in increasing the safety to personnel and the assurance of adequate equipment for performing the work in a satisfactory manner. A schedule is given of the manner of test and examination before making use of lifting materials and gear.

Riveting and Arc Welding in Ship Construction, by Commander H. E. Rossell; cloth; 210 pages; 7½ x 5 inches; with numerous drawings and illustrations; published by Simmons Boardman Publishing Co., New York; supplied by MARINE REVIEW for $2.25 plus 15 cents postage and in Europe by the Penton Publishing Co., Caxton House, London.

In this useful book, the author, who is a professor of naval construction at the Massachusetts Institute of Technology, has brought together in a clear and effective manner latest information on riveting and arc welding in ship construction. All available data from many scattered sources have been carefully reviewed and the pertinent facts are presented in this book. The problems of design have been constantly kept in mind.

As the author points out, the methods available for joining the numerous plates and shapes of a ship dictate the type of construction which must be used.

The information is presented so that it will be of practical use to ship draftsmen and structural engineers. Both riveted and arc welded joints are treated in detail from the practical as well as the theoretical point of view.

The author fully recognizes that any discussion of arc welding is subject to revision from time to time to keep up with developments. Nevertheless the information given on welded joints from the designer's point of view is of very definite value at the present time. This book will help in acquiring a sound theoretical background for the intelligent application of the rules and regulations covering design. Reference is made to United States naval practice as applied by the bureau of construction and repair of the navy department.

We believe that this book will be an invaluable aid to all those concerned with the design and construction of ships. It is clear that welding has now become, along with riveting, one of the accepted methods used in ship construction, and it is essential that designers be fully informed on the present status of its application.

Diesel Handbook, by Julius Rosbloom; cloth; 352 pages; 6¾ x 4½ inches; with illustrations; published by Diesel Engineering Institute, Jersey City, N. J.; supplied by MARINE REVIEW for $5 plus 15 cents postage; and in Europe by the Penton Publishing Co., Caxton House, London.

A book in two parts, in one volume, containing tables, formulas, and practical instruction for diesel engines of high and low speed for land, marine, locomotive, automotive, aero and portable services. It also gives information on auxiliaries and accessories.

This book is suitable for the operating diesel engineer and also for the student. The information is presented in a practical manner and will be found of interest and value both to the beginner and to the advanced diesel engineer. The subjects are discussed by the method of questions and answers.

The author points out that the language used throughout is simple and clear. Also that the text conforms with modern diesel practice within the scope of general types of diesel engines and auxiliaries.

Venetian Ships and Shipbuilders of the Renaissance, by Frederic Chapin Lane; cloth, 285 pages; 9½ x 6½ inches; published by the Johns Hopkins Press, Baltimore; supplied by MARINE REVIEW for $3.50 plus postage; and in England by the Penton Publishing Co. Ltd., Caxton House, London.

Though this is a historical study of what the author calls "the pivotal epoch in Venetian history," there is much of interest to the naval achitect and shipbuilder. The reader interested in technical details will find them in the descriptions, illustrated by sketches, of the design and construction of ships of that day.

In the outline of the lives and methods of the builders and the shipyards which they used, it is not difficult to trace the origin of many present-day shipbuilding practices which bear considerable similarity to those of the Venetians.

The author frankly admits that he has omitted some details to bring out more clearly the main changes and to show how these ships suited the purposes for which they were designed. This is a splendid book and it deserves a place in the library of all who are concerned with design, building and operation of ships.

Carriage of Dangerous Goods and Explosives in Ships, a report of the departmental committee, appointed by the board of trade of Great Britain; paper; 140 pages, 9¾ x 6 inches; published by His Majesty's Stationery Office; supplied by the British Library of Information, 270 Madison avenue, New York, or by MARINE REVIEW and in Europe by the Penton Publishing Co. Ltd., Caxton House, London.

This is a report of the committee appointed by the board of trade in February, 1930, and it was printed late in 1933.

Part one of the appendix to the report contains a full statement of the general rules which should be observed when dangerous goods are carried on board ship and also include proposals for a new system of labeling and marking packages of dangerous goods in such a manner as to indicate not only the substance in the package but also the risk involved.

Part two of the appendix contains the particular rules of packing and storing applicable to each individual substances and states whether the substance should be allowed or not allowed in passenger ships.

Subject to certain statements as to marking and labeling the board of trade has adopted the appendix to the report in place of the existing memorandum relating to the carriage of dangerous goods and explosives on ships.

This pamphlet is, therefore, of great interest to shipowners and ship operators.

The American Nautical Almanac, for the year 1935; paper; 246 pages; 10 x 7 inches; prepared by the United States Naval Observatory, Washington, D. C.; for sale by the superintendent of documents, Washington, D. C.; at 40 cents per copy.

The object of this volume is to provide the navigator, including the aerial navigator, with a compact publication containing all of the ephemeris material essential to the solution of problems of navigational position. The material is similar to that contained in the 1934 edition.

Standardization Trials Held for Cutter Algonquin

THE coast guard cutter ALGONQUIN, described in the October MARINE REVIEW, first of three sister vessels built by The Pusey & Jones Corp., Wilmington, Del., for the United States coast guard, was given a series of sea trials on the Delaware river off Deep Water point, N. J., on Oct. 3 and 4. The trials consisted of a standardization trial over a measured course of one statute mile in length, with 28 runs; a two-hour cruising speed trial; a four-hour full speed trial and a two-hour boiler test run.

Average results for each four runs of the standardization trial, which was held Oct. 3, are noted in the accompanying tabulation. Conditions during this trial were as follows: wind, none; weather, clear; visibility, good; barometer, 30 inches; direction of course, SW by S.½S.; sea, none; depth of water, 33 feet to 48 feet on course; and temperature of water 68 degrees Fahr. The speed is in knots.

The ALGONQUIN left the dock of the builder, The Pusey & Jones Corp., at 8:25 a.m. The trim of the vessel at the dock before going out was 11 feet, 1½ inches forward and 13 feet, 4½ inches aft, giving a mean draft of 12 feet, 3 inches. The displacement corresponding, in fresh water, was 1000 tons. There were 145 persons on board. The ballast in cast iron weights consisted of 19,915 pounds forward of the windlass and 28,185 pounds aft of rudder stock,, both on the upper deck. The total water on board was 18,209 gallons.

After the standardization trials, and the two-hour cruising speed trial, the ALGONQUIN returned to the dock at 7:35 p.m. Her trim on arrival was 11 feet forward and 13 feet, 3 inches aft, giving a mean draft of 12 feet, 1½ inches. The total amount of water on board on return to the dock was 16,925 gallons.

The total fuel oil on board going out, as determined by soundings, was 38,-509 gallons and on returning, 37,034 gallons. The lubricating oil going out was 405 gallons and returning 395 gallons. Measured by soundings, total fuel oil used going out, during the standardization trials, two-hour cruising speed trial, and returning was 1475 gallons. The fuel oil consumption determined by measuring tank was 1239.24 gallons during the standardization trials and 185.21 gallons during the two-hour cruising speed trial. The specific gravity of the fuel oil was 18 Baume; flash point, 170 degrees Fahr.; and B.t.u. per pound, 18,-900.

During the trials on Oct. 4, there was a 9-knot wind, due east. The weather was clear; visibility good; barometer, 30 inches; and sea, slight. Temperature of the water was 68 degrees Fahr.

The time for full speed ahead to lost headway was 72 seconds; time from stop to stern motion, 15 seconds; time stern motion to full speed astern, 50 seconds; time from full speed ahead to full speed astern, 2 minutes, 2 seconds; time full speed ahead to deadshaft, 4 minutes, 10 seconds; from full speed astern to deadshaft, 49 seconds; from deadshaft to full speed astern, 45 seconds.

From hard-over to hard-over at full speed ahead: to port, 12 seconds; to starboard, 13½ seconds. From hard-over to hard-over at full speed astern: to port, 14 seconds; to starboard, 18 seconds. The time to turn through 180 degrees with hard-over rudder at full speed ahead, was: port, 1 minute flat; starboard, 58 seconds. Diameter of turning circle at full speed ahead was two ship lengths. The time necessary to haul in 15 fathoms of anchor chain was: port side, 3 minutes, 34 seconds; starboard side, 3 minutes, 16 seconds.

Algonquin Standardization Trials

Speed	R. P. M.	Steam at Throttle Press.	Temp.	Vacuum
7.5	72.4	304	649	27.7
8.7	82.5	307	626	28.2
10.2	100.0	305	646	28.6
11.0	115.0	308	645	27.8
12.0	130.0	308	638	28.4
12.6	140.0	307	631	28.0
12.8	142.0	305	629	28.1

The ALGONQUIN and two sister vessels, COMANCHE and MOHAWK, are single screw vessels propelled by a Westinghouse Electric & Mfg. Co. impulse type, double reduction geared turbine, developing 1500 horsepower at a propeller speed of 140 revolutions per minute.

Steam for these vessels is supplied by two Foster-Wheeler marine water-tube boilers operating under steam pressure of 310 pounds per square inch at the superheater outlets and with 200 degrees Fahr. superheat. Each boiler is fitted with three Todd oil burners.

Fireproof Interiors

(*Continued from Page* 17)

make the ship unstable to the danger point, unless permanent ballast were added. If weight were taken into consideration and the steel panels properly thinned, they would have a tendency to buckle and to deteriorate rapidly because of corrosion. If all existing panels on a particular ship were replaced with aluminum, on the other hand, the relation between the center of gravity and the center of buoyancy would be so disturbed that the reconstructed ship would be most uncomfortable because of an undue increased stability — unless the aluminum panels were made thicker than need be.

The combination which will probably work out to best advantage would be the use of aluminum for partition bulkheads between cabins and staterooms, and the use of steel for transverse bulkheads at more frequent intervals than has been customary. Such a combination would not affect the stability of the ship. Aluminum walls, as shown by the tests, are able to confine a fire for a considerable time to its point of origin, but should the fire eventually break through it would not be aided in its progress by any combustible material in the wall itself and would shortly come in contact with steel. Before breaking through this material, which has a melting point of 2700 degrees Fahr., an efficient fire-fighting force would have time to extinguish the blaze.

Insulating Material

Another type of protection coming into greater use is the application of aluminum foil for insulating purposes. Though the function of aluminum foil primarily is the insulating of store and refrigerator rooms, it was found surprisingly able to withstand high temperatures in the burning of L'ATLANTIQUE. Much of the foil used for insulation by the French liner was found to be intact after a blaze had roared around it for hours.

Aluminum foil is used on the REX, the CONTE DI SAVOIA, the LANCASTRIA, the BREMEN, the GENERAL VON STEUBEN, the ILE DE FRANCE, the CHAMPLAIN, the PARIS, and many other high-class ships, including various types of vessels of the navies of France, United States, Great Britain, Germany, and Italy. It weighs only one-seventieth as much as cork and is used to insulate cabins, shaft walls, decks, uptakes, exhaust gas boilers, boiler shaft walls, meat, ice, fish, vegetable, and beer refrigerators, and around galleys, mufflers, and brine piping.

The United States engineer office, Duluth, Minn., on Nov. 22 opened bids for drydocking, painting, and general repairs to the United States dump scows Nos. 11 and 12 located at Sandusky, O.

American Machine & Engineering Corp., Pittsburgh, will furnish three steam engine and capstan units for the Pittsburgh Coal Co.'s tow boat, CHAMPION COAL, which Dravo Contracting Co., Pittsburgh, is now building.

Naval Architects Meet

(*Continued from Page* 15)

the ownership of small tankers is more diversified and, in a few instances, economical transportation takes precedence over safe transportation; seventh, they are often built and operated with very little, if any, inspection and regulation on the part of competent agencies or governing bodies.

The Human Element

There is general agreement among all the operators of tankers that, to quote an official of one company: "Carelessness, or the human element is directly responsible for the majority of fires and explosions, therefore, a constant education of the members of the crew is considered to be a prime factor in promoting safety."

No amount of thought and care expended in the building of the vessel will be fully effective without the co-operation of the entire crew from the captain down to the least experienced deck hand. We are forced to admit that the most complete provisions for safety in the structure, machinery and equipment can be nullified by carelessness and ignorance. However, safety built into the vessel will counterbalance a good deal of carelessness, and suitable living conditions, even on a smaller boat, will help the operators to keep men in their employ who are capable of being educated. The designer, then, has his responsibilities.

New Officers and Members

UP TO the time of the annual meeting, applications were received for 84 members, 22 associate members and 15 juniors, making a total of 121. These applications for membership to the society were acted upon favorably on Nov. 16. The total membership of the society on Oct. 31, 1934 was 1492. With the addition of the newly elected members, and the subtraction of 27 members who died during the past year and 21 members who resigned, the total membership of the society at the conclusion of the annual meeting this year was 1565.

Honorary members, officers and council members elected at this meeting are as follows: Honorary member, J. Howland Gardner; honorary vice president, William L. R. Emmet.

Vice president, for term ending Dec. 31, 1937; John F. Metten; William L. R. Emmet; Ernest H. Rigg; and Howard H. Brown.

Council members, terms ending Dec. 31, 1937; John E. Burkhardt, H. Gerrish Smith, Walter E. Thau, Frank M. Lewis, William W. Smith, and Henry Williams.

Associate council members, terms ending Dec. 31, 1937; Henry E. Cabaud, James Plummer, and Edward G. Sperry.

Vice president, vice William L. R. Emmet, term ending Dec. 31, 1937, H. Gerrish Smith. Council member, vice H. Gerrish Smith, term ending Dec. 31, 1937, Arthur B. Homer. Associate council member, vice H. L. Aldrich, term ending Dec. 31, 1935, Emmet J. McCormack. Secretary-treasurer, H. Gerrish Smith, Assistant secretary treasurer, Thomas J. Kain.

The executive committee now consists of George H. Rock, ex-officio, Washington L. Capps, Homer L. Ferguson, J. Howland Gardner, Joseph W. Powell, Morris Douw Ferris, Carl E. Peterson, J. H. King and H. Gerrish Smith, ex-officio.

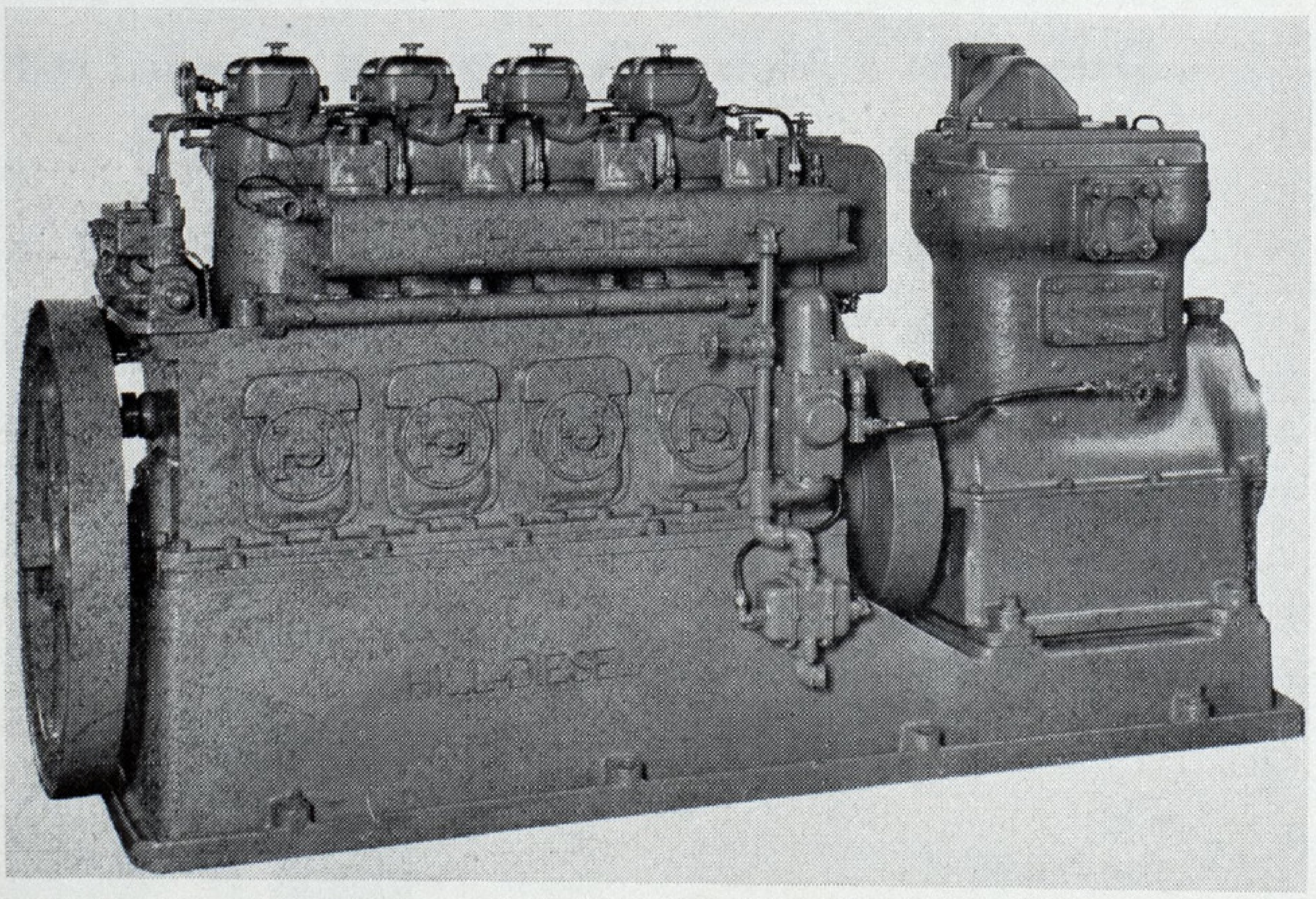
The endownment fund of the society on Oct. 1, 1934, at market value, amounted to $118,349.64. The general fund on the same day amounted to $17,921.88. The interest received from the endownment fund investment and from savings back deposits for the year ending Oct. 31, 1934 amounted to $6224.32.

The annual banquet held in the main ballroom of the Waldorf-Astoria hotel was one of the most successful ever held. The attendance was over 900. In his address, the president of the society, Rear Admiral G. H. Rock, CC., U.S.N., retired, emphasized the unanimous opinion of the members that the convention for safety of life at sea signed in London in 1929 should be ratified by the United States at the earliest possible moment. He also advocated the approval of funds for the building of a national model tank as outlined in his presidential address at the opening of the technical sessions. The only other speaker was the Hon. Charles A. Eaton, congressman from New Jersey, who vigorously advocated a practical government policy for the encouragement of the merchant marine.

Following the custom of recent years a dinner dance for members of the society and friends was held on the S. S. WASHINGTON of the United States lines on Saturday evening, Nov. 17.

That the maritime industry of the United States is firmly established and that it may look forward to a future of increasing power and influence should be evident to anyone who attended this annual meeting of the Society of Naval Architects and Marine Engineers.

The St. Lawrence canals will be kept open for the passage of downbound vessels entering the head of the Galops canal, and upbound vessels entering the lower entrance to the Lachine canal, prior to midnight of Nov. 30, if weather and conditions permit. After that date any or all of these canals may be closed upon 24 hours notice.



A MODERN diesel driven compressor unit for marine service. A four-cycle, four-cylinder, solid injection, 36 b.h.p. at 600 r.p.m. Hill diesel engine, direct connected through a friction clutch to a Worthington compressor. Capacity, 45 cubic feet displacement and 500 pounds per square inch pressure. The engine is of trunk piston type, and is equipped for air starting. Two of these sets were recently supplied by the Hill Diesel Engine Co., Lansing, Mich., to the Lighthouse service for furnishing air for the fog horn on Lightship No. 84

Marine Review

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The National Publication Covering the Business of Transportation by Water

S. S. Angelina—Modern American Freighter

December, 1934

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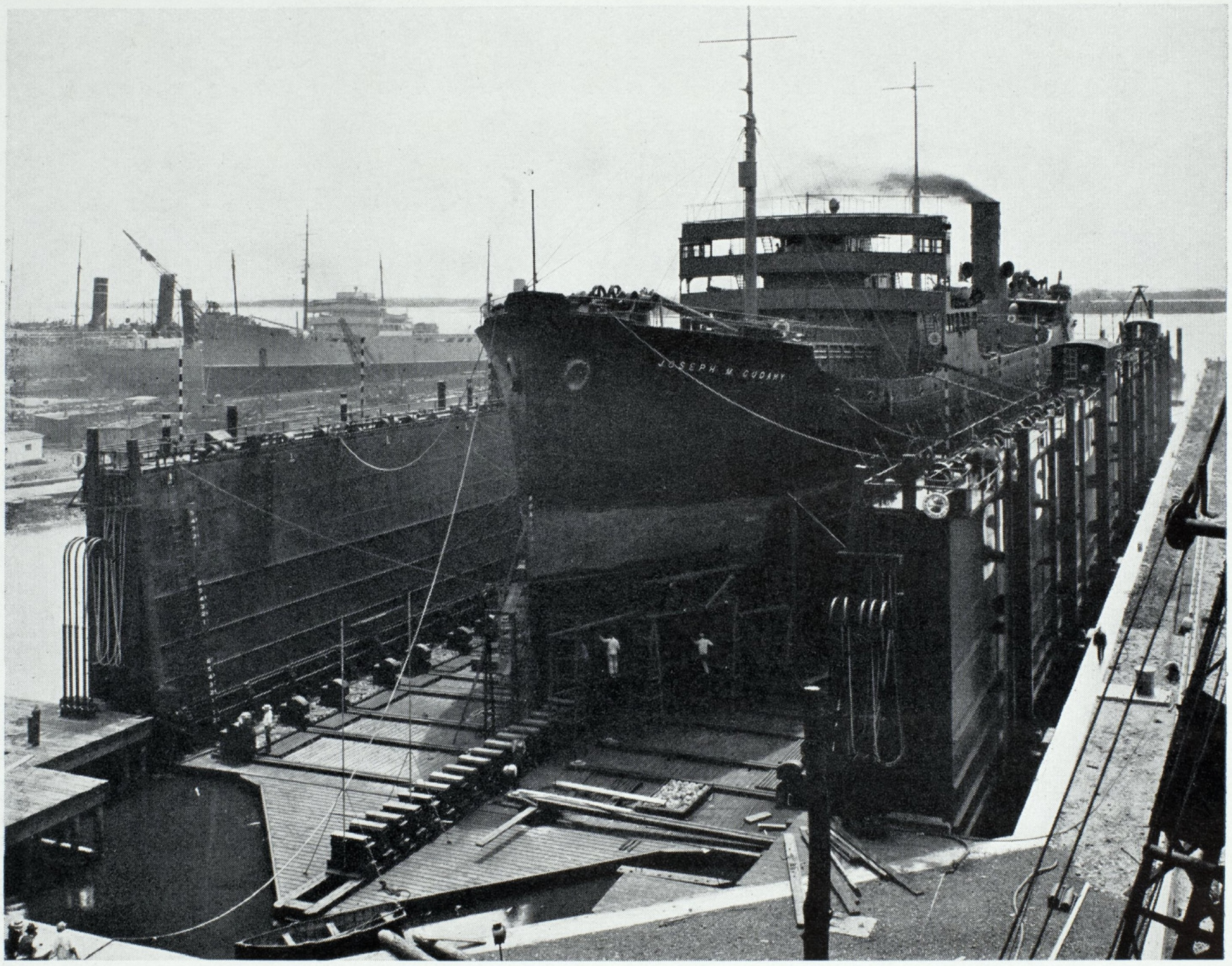

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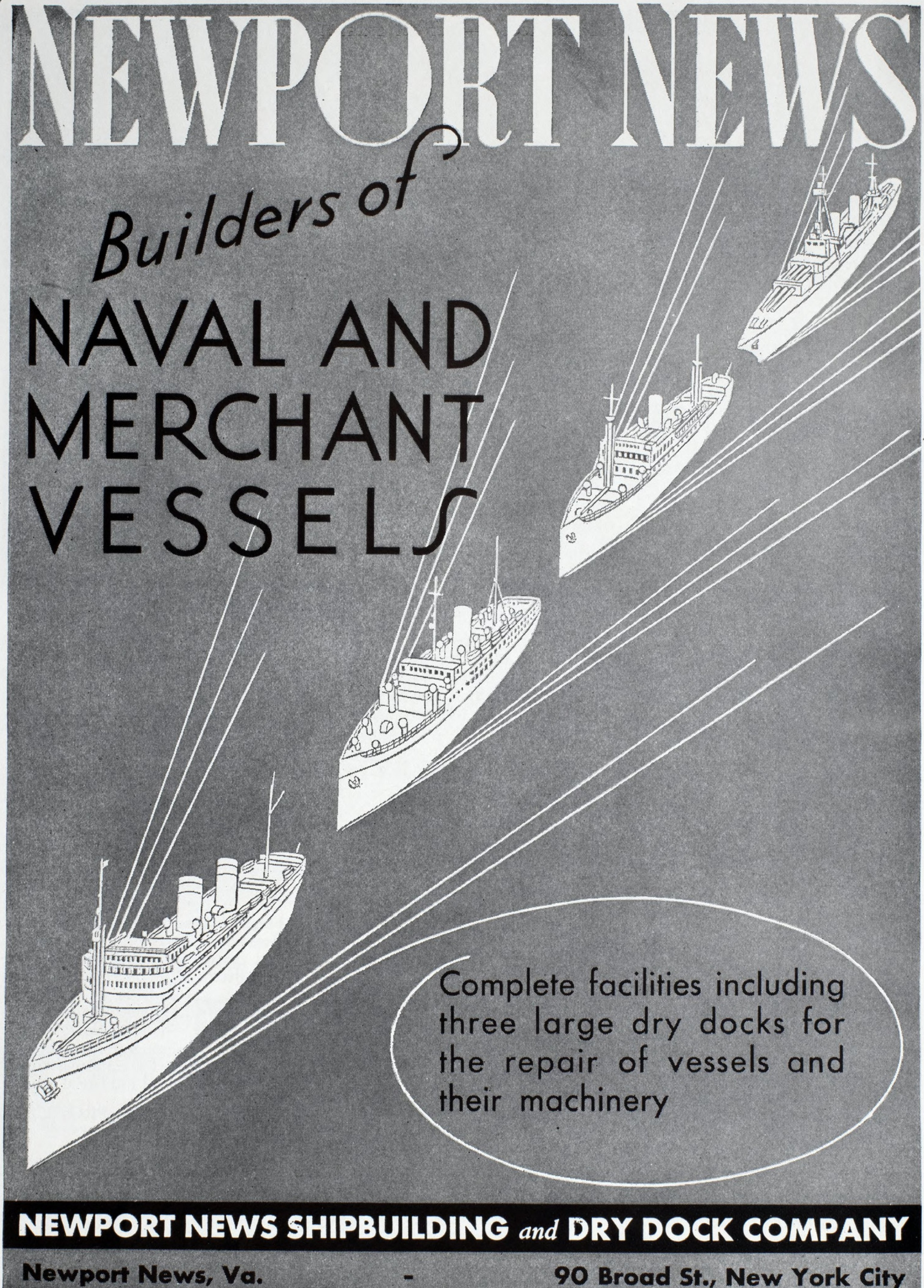
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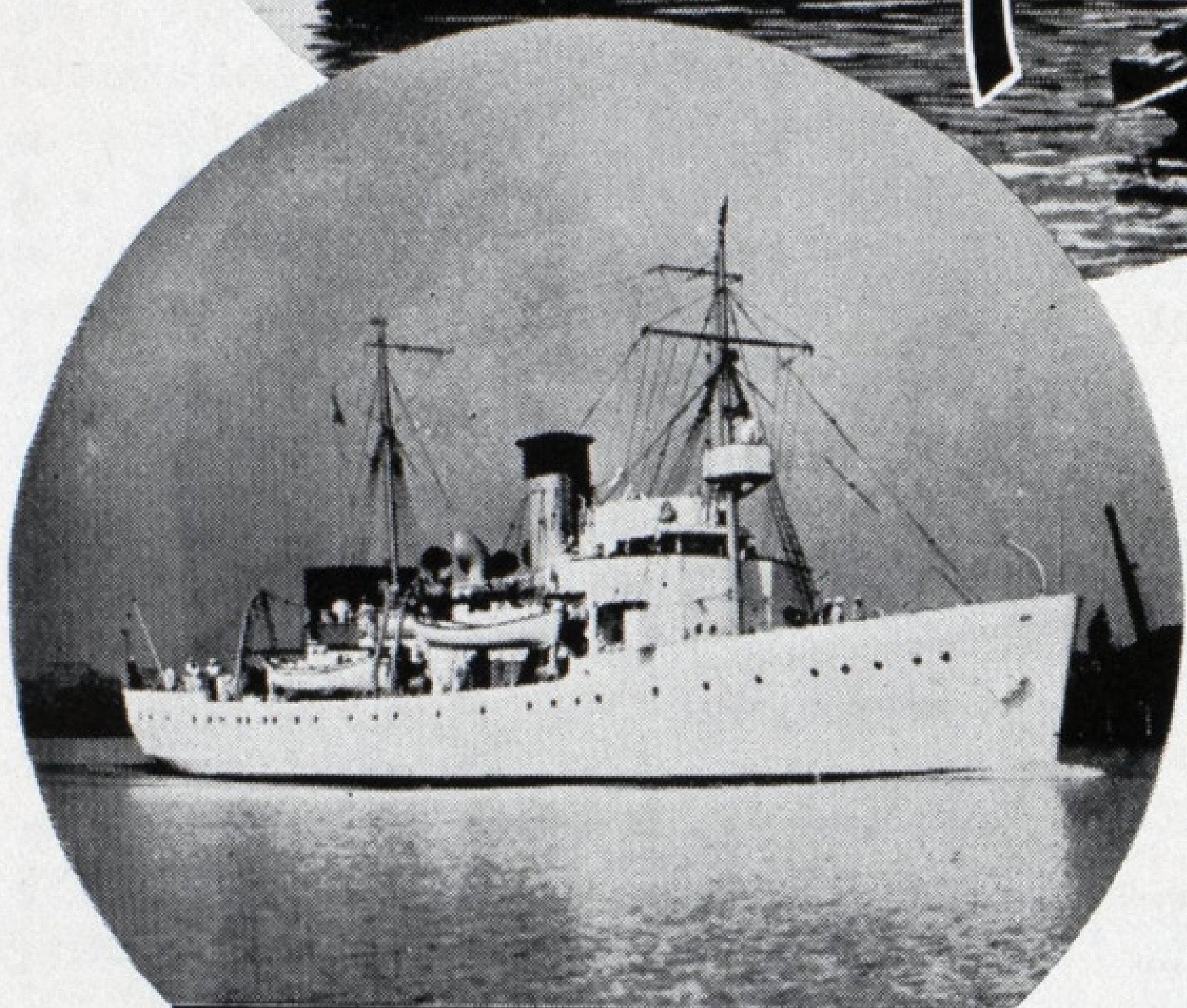

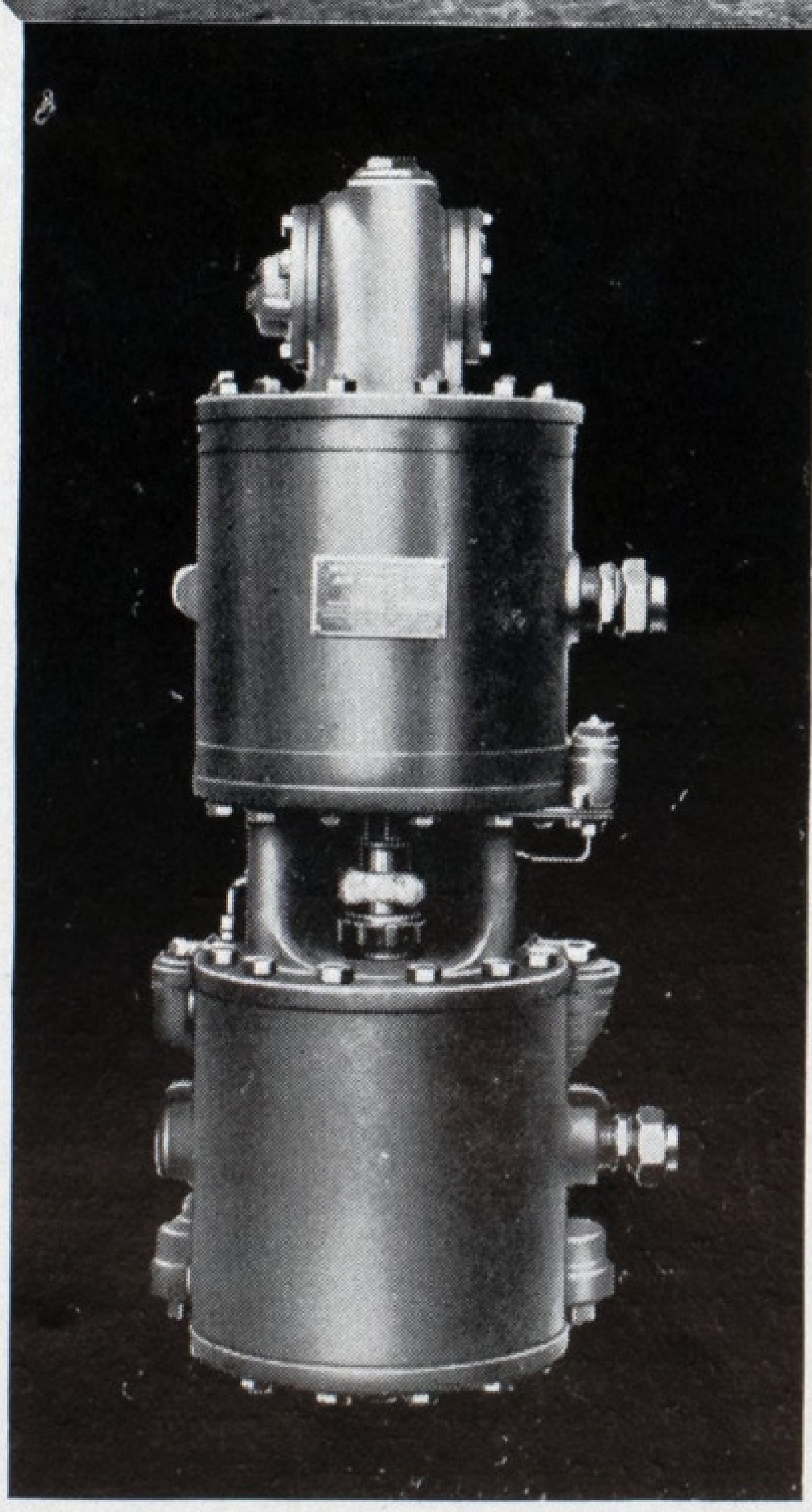

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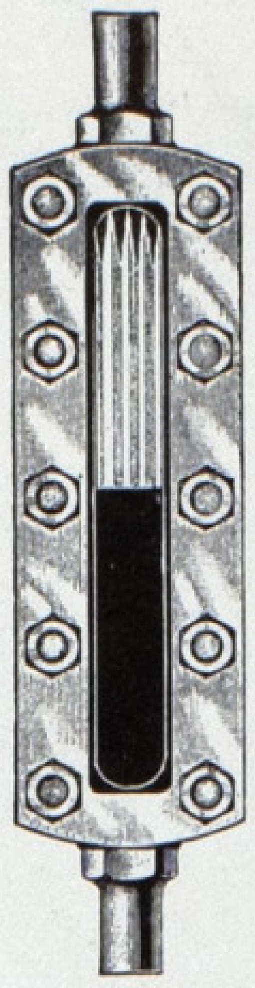

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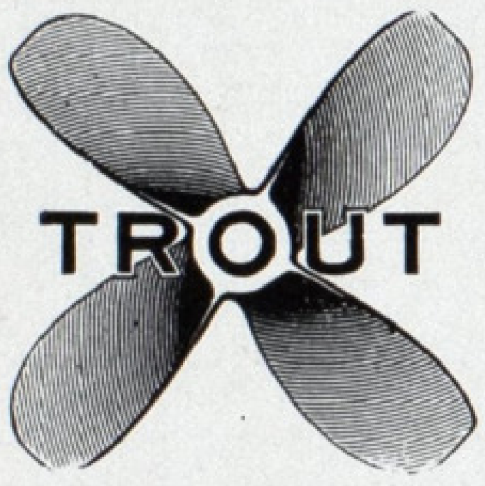

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HE is using The Elwell-Parker Complete System of Materials Handling (not merely Elwell-Parker Trucks alone) to keep freight moving between box car or motor truck, shed, and dock alongside ship. He is handling a *larger* volume than ever, more *profitably,* and with fewest cargo and accident damage claims.

The Elwell-Parker System comprises New Elwell-Parker Tiering Fork Trucks (electric, gas, or gas-electric power, as preferred); inexpensive wooden pallets or cargo-boards, as shown in the picture, and greatly-increased loads of merchandise mounted on the pallets in Boxes, Bags, Barrels or Bales. Trucks are especially designed to lift and transport pallet and load together.

This System makes productive use of every minute in receiving, storing, and delivering to dock. Freight is placed on pallets as it comes in, and is stored as a unit in shed. Loads on pallets are always ready for immediate transfer from shed to ship. The moment the ship is ready to take on cargo, loads are immediately delivered alongside—still on pallets.

Elwell-Parker has the engineering knowledge, field training and facilities to meet the most complex or unusual problems of materials handling. The Elwell-Parker System of Materials Handling is one product of this long, successful practise. Experienced Engineers will gladly show how it will earn for you.

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1. Readily adjusted to take up wear
2. Can be adjusted in the cylinder
3. A true circle at all diameters
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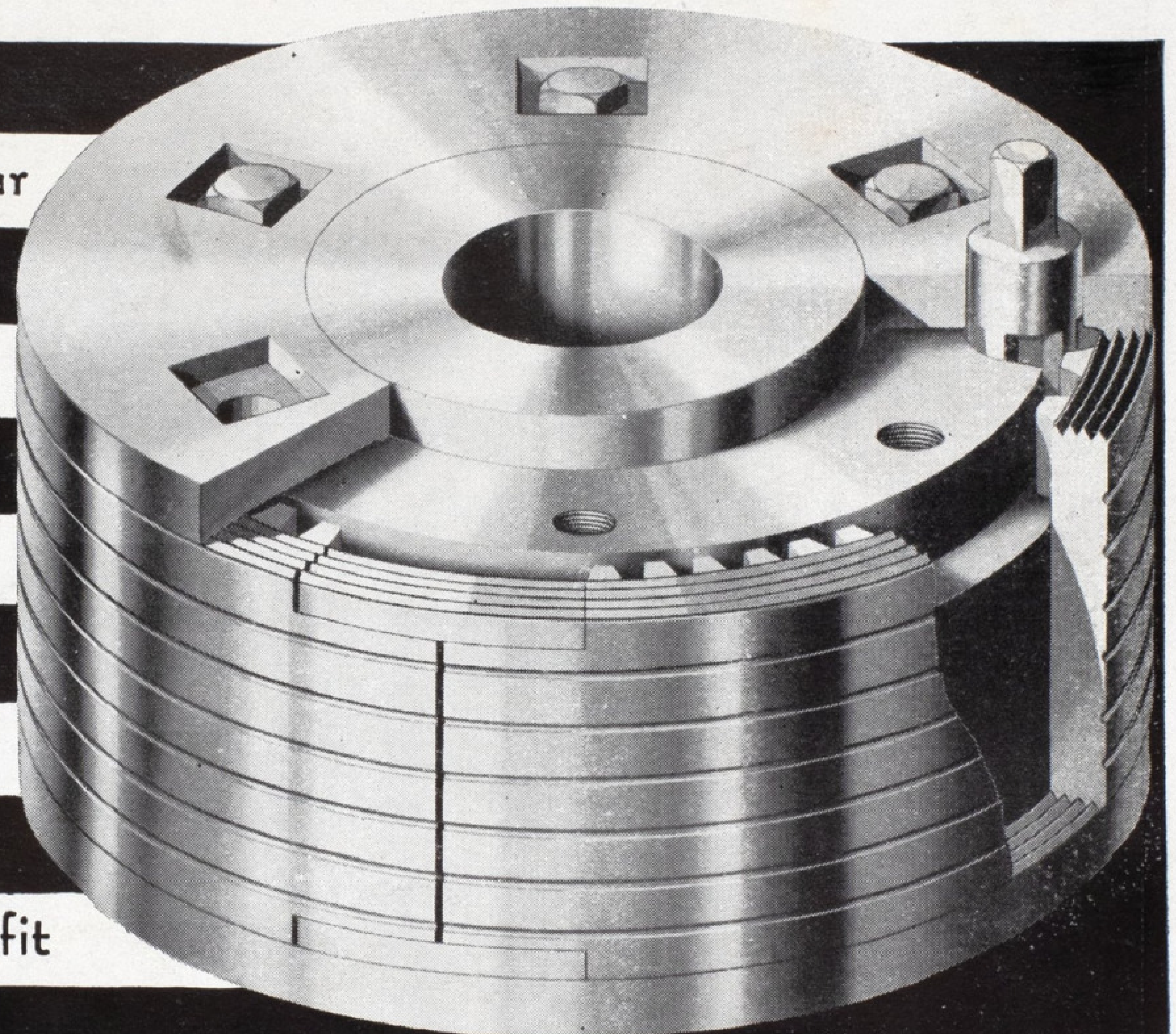

Adjusting is accomplished by loosening the follower, removing a small plug and inserting in place of it a pinion. This engages a rack, as shown in the cutaway. The pinion is turned until the "feeler" used indicates proper clearance. The follower bolts are then screwed down tight, the pinion is replaced by the plug and the piston is solid once more.

THE plug piston is well known to engineers as the simplest, most reliable type of piston. It is safe because it cannot steam set . . . cannot harm cylinder walls.

But the ordinary plug piston becomes worn after a short time in use and develops steam leaks. This means lost power . . . and waste.

The new Bodenlos ADJUSTABLE Plug Piston can be adjusted at any time, *without removal from the cylinder*, to a small fraction of 1/1000 of an inch. It can readily be made smaller or larger, as desired, and can be adjusted in a few minutes at any point in piston travel.

The new Bodenlos ADJUSTABLE Plug Piston is a true circle at all diameters and adjustments. It is made of finest cast iron and will wear indefinitely. It will soon develop a mirror-like polish and it can always be kept tight against the cylinder walls, with the correct tolerance.

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